contractors and engineers monthly

OCTOBER 1952

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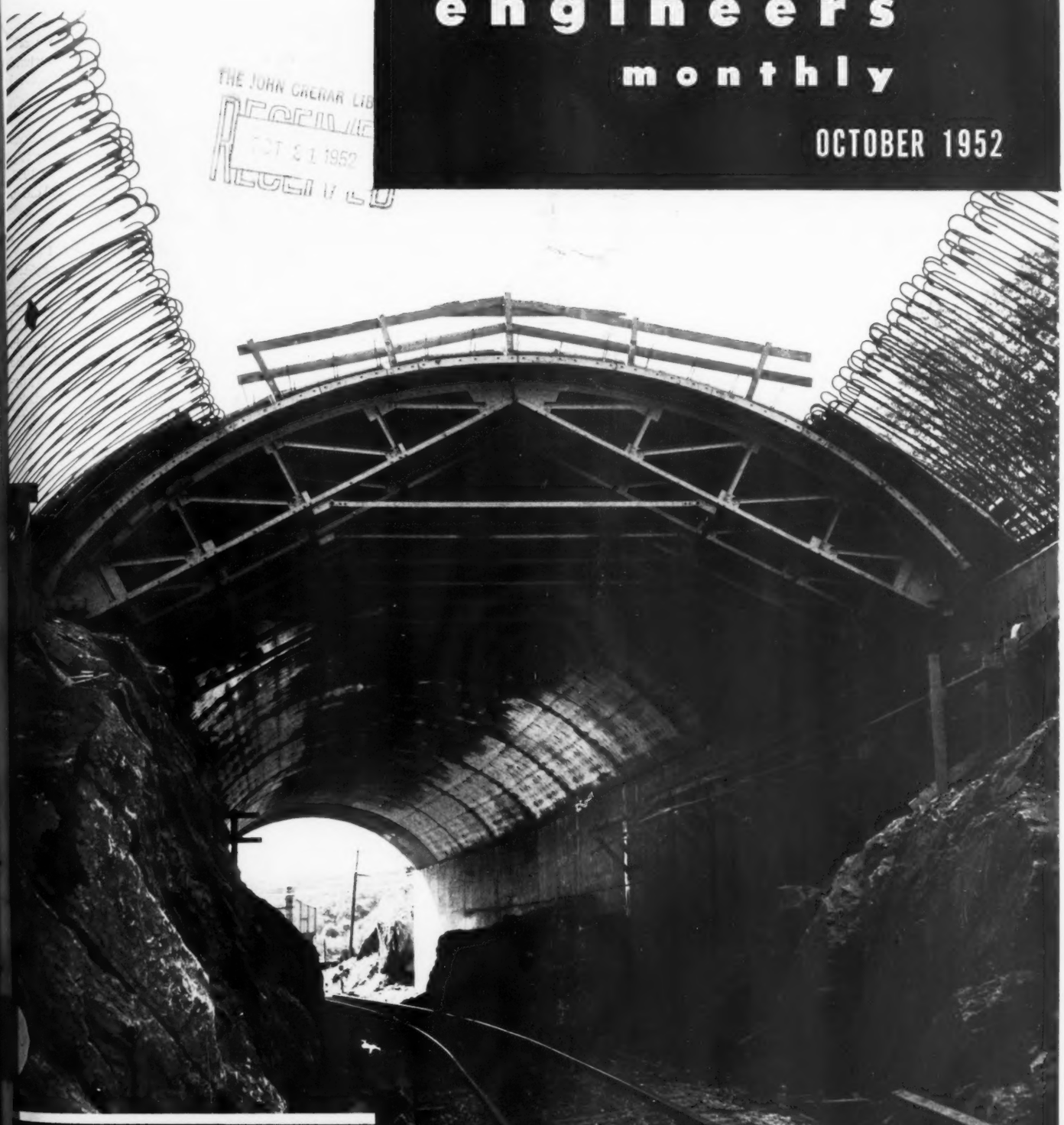

Looking through the partially completed reinforced-concrete arch structure which has been built to carry heavily traveled highway routes over the New Haven Railroad in Connecticut. *Story on page 50.*

The dredge Shirley throws up a sand screen on the Chain of Rocks Canal along the Mississippi.

Dravo Corporation officials display safety flag after power-plant job records 500,000 accident-free manhours.

NEWS AND VIEWS

of the construction industry—controls relaxing, but metals are scarce.

The construction picture continues to look very bright. Despite record activity in recent years, there is still a tremendous backlog of needed construction. Over $18 billion in new construction was put in place during the first eight months of 1952, and new huge defense projects will probably raise the volume of construction under way to an unprecedented level.

Shortages of steel, copper, and aluminum are still keeping the backlog high, but the trend is definitely toward a **relaxation of controls.** Gasoline taxes are twice what they were in 1946, providing funds for the biggest road-building program ever—as soon as materials are available again. Building contractors who have been feeling the pinch for over two years now might note the Government's recent announcement that it would **lift the ban on recreational and amusement projects.** The NPA said builders could start ordering steel, copper, and aluminum now for use after April 1.

When full-scale building begins again, New York City contractors may find a few new features in the plans and specifications. Seven measures recently introduced in the City Council will provide a **modern, integrated building code** covering flat-slab concrete construction work. The sponsors explain that lighter structural weight would cut costs and simplify electrical work, and lathing and plastering.

Speaking of costs, the Bureau of Public Roads reports that **highway-construction costs** rose to a new all-time high in the second quarter of 1952. It now takes $239.80 to do all the work $100 did in 1940.

At any rate, the increase is probably not worrying the officials of our two big eastern **turnpikes.** All-time highs were registered on both the Pennsylvania and New Jersey Turnpikes in August. Pennsylvania reports that 1,336,583 vehicles paid tolls amounting to $2,232,720 during that month. **The 2-million mark** was finally passed on the New Jersey Turnpike with 2,011,490 vehicles paying $1,843,401—about twice the volume predicted in preliminary engineering surveys. These encouraging reports should greatly influence toll-road-feasibility studies recently authorized in Louisiana, Massachusetts, and Michigan.

Maryland's new $45,000,000 Chesapeake Bay Bridge carried 252,124 vehicles during its first four weeks, almost three times as much traffic as had been estimated.

Covering the Field

- **Airport**
  One at Burlington, Vt., is improved for military flying. Page 10.
- **Bridges**
  A traffic bottleneck is relieved in Connecticut by the tunnel-bridge structure shown on the cover. Story and additional pictures on page 50.
  Small bridges play big role in spanning gorges in Oregon. Page 77 tells how.
- **Buildings**
  Turn to page 15 to see how a cantilever design eliminated underpinning.
  Sprawling Fairless Works—the latest in steel mills—gets pix and story treatment on pages 36 and 37.
  The importance of high-tensile bolts for cutting steel-erection costs is discussed on page 60.
- **Conventions**
  Page 29 has a calendar of forthcoming meetings.
  Construction's role in the national life was the subject of a talk by the AGC's Managing Director before the ASCE Centennial Convocation. Page 105.
- **Dam**
  How slides were halted at a dam. Detailed description on page 20.
- **Dock**
  Portland, Oreg., adds a new dry dock to its waterfront facilities. Story, page 4.
- **Distributor Doings**
  Starts with an article on a brush-clearing demonstration. Page 92.
- **Dredging**
  A spanking new dredge is built for work far across the sea. Page 90.
- **Highways**
  The new Milwaukee expressway gets under way. Grading, excavating story on page 24.
  County-road work on a linear-mile contract basis. Read about it, page 45.
  Stabilizing a road base with lime. Page 70.
  Oklahoma's Turner Turnpike. Story, pix, page 112.
- **Law**
  Sage advice on nailing down profits is to be found on page 65.
  "Avoid Legal Pitfalls": page 87.
- **News and Views**
  The construction scene looks bright. See page 2 for comments, pictures.
- **Paving**
  A checking device for base-course thicknesses of road-mix makes things simpler all around. Page 17.
  Concrete for a busy two-level interchange near a tunnel entrance eases a New Jersey traffic nightmare. Page 30.
  A new concrete deck is put down under heavy traffic on a high Mississippi River bridge. Page 55.
  A double layer of hot-mix replaces a treated gravel road in Arkansas. Page 73.
  Bituminous concrete, too, for widening, resurfacing a Missouri highway. Page 103.
- **Portrait in Print**
  An interview with Texas Thomas S. Byrne gives some interesting sidelights on a big building contractor. Page 84.
- **Roadside Development**
  Heavy equipment cuts brush from slopes in North Carolina. Page 49.
- **Safety**
  What to guard against while blasting. Turn to page 83.
- **Sewage Treatment**
  A one-pass dirt backfill was a new wrinkle in sewer trenching. Read about it on page 97.
- **Soil Conservation**
  Earthfill barriers afford upstream protection to an agricultural valley. Page 39.
- **Vehicular Tunnel**
  An under-river tube at Havana, Cuba, relieves traffic congestion. Page 101.

Contractors and Engineers Monthly

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For the

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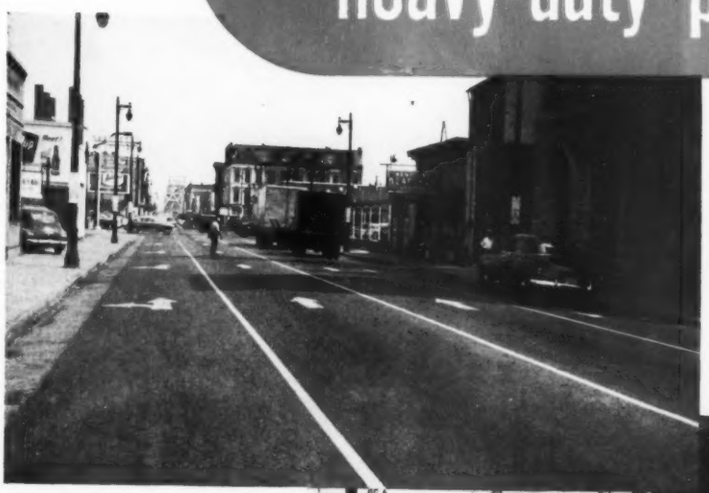
Where Louisville traffic calls for

heavy-duty paving



SECOND STREET, Louisville, Ky. (U.S. Route 31E), over which traffic approaches George Rogers Clark Memorial Bridge, is paved with hot-mix Texaco Asphaltic Concrete.

THIRD STREET, over which traffic from the bridge reaches US-31W, also is paved with hot-mix Texaco Asphaltic Concrete. The contractor was the George M. Eady Company of Louisville.

Second Street and Third Street in Louisville, Ky., are two of this city's most heavily traveled thoroughfares. Second Street is a one-way approach for traffic to the George Rogers Clark Memorial Bridge, which links Kentucky with Indiana. Third Street serves traffic coming from the bridge.

Due to the steadily increasing volume of bridge traffic, the Kentucky State Highway Department has widened both streets to four lanes. At the same time, a new heavy-duty wearing surface of hot-mix Texaco Asphaltic Concrete has been constructed on these busy thoroughfares in two courses, each 1½ inches thick.

In Louisville and throughout the country, road builders construct hot-mix Texaco Asphaltic Concrete paving wherever heavy traffic must be served—on important streets, main highways and major airports. Because of its ability to absorb impact, its freedom from joints, low susceptibility to temperature extremes and immunity to ice control chemicals, this type of construction is able to stand up under the hardest kind of service for years with a low upkeep cost.

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TEXACO

TEXACO ASPHALT

Port Adds Dry-Dock Facilities

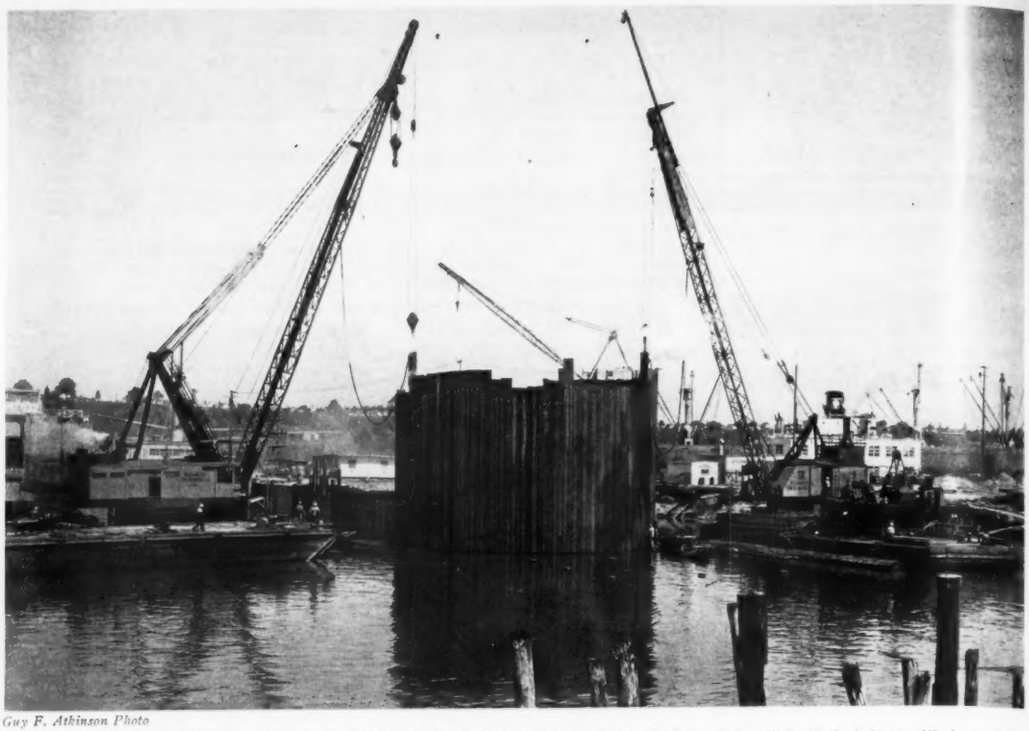
Piers Planned for Unusual Loads; Extra-Length Piles Driven to 450-Ton Bearing In 50 Feet of Water

By RAY DAY

• AT Swan Island, smack in the center of the old shipyard Henry Kaiser made famous during World War II, the Port of Portland, Oregon, and Guy F. Atkinson Co. have an interesting $1,957,400 waterfront project under way. When it is finished some time about the middle of 1953, Portland will have consolidated its port facilities for even greater efficiency than before. The port is already so famous up and down the Pacific coast that its dry-docking facilities are usually full, with ships racing up the Columbia River to be the next to get in.

The New York consulting firm of Frederick R. Harris was called in to design the unusually heavy facilities. The 1,080-foot main pier, for example, is expected to get corner loads of 227 tons under the 50 to 75-ton gantry cranes which will serve ships under repair. In addition to this main dock a parallel finger pier is to be built, along with a new contractor's building, a shop building, and a boiler house. Considerable granular fill will also be required to bring the ground around the new facilities up to grade.

Previous dredging in the area, coupled with demolition of some of the eight ways in Kaiser's World War II shipyard, has made room for the work. The Port of Portland's dredge Clackamas left 50 feet of water under the dry-dock location inshore, and 30 feet farther out.



Guy F. Atkinson Photo

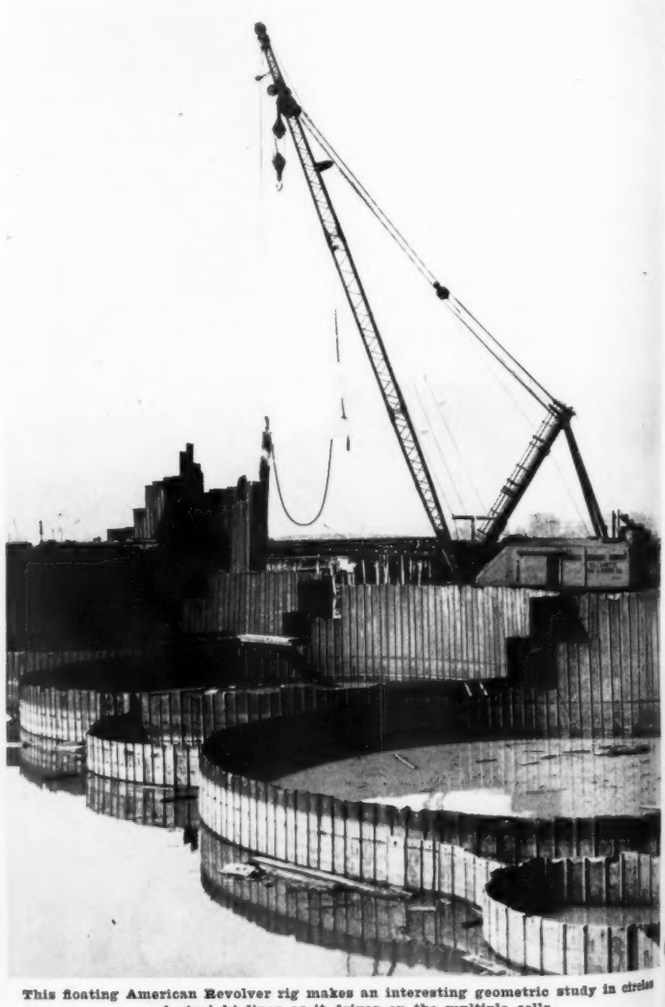
Heavy pile hammers puffing simultaneously share the job of driving this circular cell. A wood template 10 feet deep with iron channel wales top and bottom guides the piling.

Design Interesting

The final design by Frederick R. Harris is the most economical and workable solution for a tough problem. Fine sand and silt in this location offers little in the way of bearing value, and it was necessary to develop plenty of bearing in the main pier.

Precast-concrete piles, as well as precast, prestressed, open concrete piles were considered at first. The final design, based on economics, was for open-end pipe piles to carry the vertical loads, and H-beam batter piles to carry horizontal thrust. Maximum momentary loads, including impact, are expected to be 234 tons on the 24-inch-diameter $\frac{3}{8}$-inch-thick pipes. Loads on 18-inch piles are expected to be 167 tons. These pipe piles are being filled

A McKiernan-Terry 9-B-3 pile hammer on a barge-mounted derrick drives steel piles for the Swan Island bulkhead. Piles went down over 100 feet into the sand.



This floating American Revolver rig makes an interesting geometric study in circles and straight lines as it drives on the multiple cells.

with 3,500-pound concrete.

The concrete slab deck of the main pier is designed for 1,000 pounds per square foot. Beams are figured for 800 psf, and supporting piles for 750 psf. This structure will carry a 170-ton locomotive, heavy gantry cranes, and H15-S44 truck loading. Aerodynamic calculations placed the wind pressure at 20 psf on both dry dock and the maximum-size ship it will serve. The wind load was figured at 3,000 pounds per linear foot of the main pier, which is sizable when such a structure must be supported 82 feet off the ground.

The inboard 580 feet of the main pier is being supported on 24-inch pipe piles, each pile driven to 450-ton bearing, with 5 piles per bent and bents 21 feet apart. On the outboard 500 feet there are two 18-inch piles per bent, with bents 21 feet apart. Lateral support is furnished by 14-inch 89-pound steel H-beams driven to batters of 5 to 12 and 7 to 12. The deck width is 50 feet for the inboard 580 feet; 32 feet on the other 500 feet.

Also being installed on the pier is a 131-pound crane rail, laid on the inboard 580 feet and extending 915 feet landward. A 100-pound standard-gage railroad track will also be laid full length over the pier, and it will extend landward 600 feet to connect with the yard tracks.

The paralleling finger pier, which will be used mostly to handle lines from incoming or outgoing ships, will be 520 feet long x 5 feet wide at the top. It will be supported on 24-inch pipe piers on 40-foot centers. The top will be made of structural-steel members, with steel grating. An underwater bulkhead, built of salvaged Z-type piles, will be constructed nearby to protect the dredged slope.

The main bulkhead along the new waterfront consists of six circular cell bulkheads of straight web sheet piling. Each cell is 69 feet in diameter, with connecting arc walls. Piles vary from 95 to 105 feet in length and are driven to a tip elevation of minus 73, with the top of bulkhead at plus 32. These sheet piles are designed to retain the extensive land fill which will be placed later on.

The new buildings are similarly designed. They consist of reinforced-concrete footings and floor, a structural-steel and lightweight-masonry-block superstructure, lightweight-concrete plank roofing, and 12-inch H-beam supporting piles. The contractor's building will be 160 x 75 feet; the shop 194 x 97 feet; and the boiler house 24 x 30 feet. Equipment now in use at the St. Johns district will be reinstalled in the new shop building.

The Port of Portland is furnishing all sheet piles, pipe and H-beam piles, and structural steel.

Big Pile-Driving Assignment

The project calls for extensive pile driving, and for many months to come the reverberation of steel pile hammers will bounce back from the low hills of Portland to the flat island peninsula where the work is being done.

Tiers of steel H-piles stacked in square pattern for test.

The pile test in the finger pier—permanent piles were driven in place as shown, and then one was loaded for the test.

There were several features about the project which made special arrangements necessary. For example, a variety of pile types was included in the project, and the contractor wanted to use one type of driving head under his hammers to drive any type of pile whenever necessary. After much figuring, a driving head with several step tapers and an H-slot was figured out which would fit 12 and 14-inch H-beams, or 18 and 24-inch pipe piles. It had to be cast and machined specially at Esco's foundry in Portland.

(*Continued o . next page*)

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Oregon Port Adds Dry-Dock Facilities

(*Continued from preceding page*)

Too, the job of driving extra-length pipe piles called for long leads and some type of special rig. Special leads were built to reach 96 feet in the air off the barge deck, and to handle a Vulcan 80-C pile hammer. This set of leads was mounted on a derrick barge, with the derrick assigned to raising the piles to the leads. A built-in moonbeam arrangement, with pins and holes to develop correct batter, was also arranged so this rig could drive the long H-beams which brace the structure laterally.

The circular cells present no special problem, because this is a straight pile-driving job with only the usual rigging problems, and an element of danger for the man threading the pile sections. The circular cells are being driven by a pair of rented American Revolver barge-mounted cranes, which split the work evenly for each half of a cell. A wood template 10 feet deep with rolled channel-iron wales top and bottom is being used as the guide for each cell. The inshore derrick barge can take its pile sections from shore, while the outboard rig has to have its pile sections hauled out on a flat barge. The piles are loaded to the barge by a small Lorain Moto-Crane, which also handles all of the piling in the yard for splicing.

On both the American rigs, McKiernan-Terry 9-B-3 pile hammers are being used for the sheet-pile driving. The hammers are so arranged that three pile sections are driven at once. Each machine threads and drives its own half of a cell. Splices are made by welding flat plates across the joint on both sides of the piles and are designed to develop the full value of the pile.

Unusual Pile Test

The pile-loading criteria were considered so important that the consulting firm called, in its specifications, for a pile-bearing test in the finger pier. The bid prices for this item were interesting, ranging up to about $12,000. Atkinson's bid was only $2,500.

Exactly how to make this test was a matter of some concern. Several methods were studied. Finally Project Engineer J. B. McNabb came up with an idea which met with everybody's approval.

After studying the pattern of piles in the pier, McNabb picked 9 piles centered together in a typical pier section. The center pile of this lot he selected for the test. The other piles he selected to serve temporarily, until the test was started, as temporary support for the weight he intended to apply.

He had planned to use four 100-ton jacks, but by a lucky coincidence he found, in his own organization, a 530-ton Dudgeon jack which had been used on a spillway-raising project at Rock Island Dam, near Wenatchee, Wash. McNabb got this jack and a hand pump for its operation.

The jack was positioned over the test pile, and weight was applied by stacking many tiers of H-piles evenly in a square pattern. Alternate tiers were laid at right angles to each other so that the weight could be evenly distributed and the bottom tier would not be overloaded. When sufficient weight had been stacked up, the test load was applied on the jack. It was not necessary to arrange for a tie-down to the other piles, but if it had been, the contractor prepared tie-down anchors of 2-inch-round steel rods which he planned to weld from the pile to the steel sections of the load.

The single jack worked well, except that it proved the bearing value of the sand and silt to be less than was originally calculated. Studies were under way when CONTRACTORS AND ENGINEERS MONTHLY visited the project, and project officials expected at least some increase in pile lengths. It may well be that some 200-footpipe piles will be used in the finger pier.

Good Safety Program

In spite of the danger of threading piles 60 feet in the air, or working

Project Engineer Joe B. McNabb (with pointer), talks over field difficulties with Resident Engineer Hal Hunt (middle), and General Superintendent Lee Cox.

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Dudgeon 530-ton jack positioned over test pile.

around live steam and tight rigging, Atkinson's safety program is working well, and only two lost-time accidents have marred a perfect record. They were not bad ones. Each month a major safety meeting is held, and local meetings are held weekly. Full-time safety representatives from Atkinson's headquarters office at South San Francisco visited the project, and a dress rehearsal in the form of a dinner and meeting was held.

In the belief that a safe job is also easier on equipment, Atkinson's safety is geared to equipment use in a great number of cases. For example, a man getting hurt is bad. If he tears up a $75,000 piece of equipment while he's getting hurt, it's even worse.

At the time this magazine visited the project, no work had been started on the 8-inch reinforced-concrete deck. Plans had been completed, however, to use truck-mixed concrete from a local commercial plant, and to carry it from a transfer hopper out to the point of placement in Gar-Bro motorized Power Carts.

Port of Portland Organization

The magnitude of the present reconstruction program of the Port of Portland can better be understood by taking a look at the agency itself, because it is probably the only such organization in the USA. It was back in 1891 that the Port of Portland was set up by the Oregon State Legislature, and charged with (1) making and maintaining a channel to the sea adequate to accommodate and promote the maritime commerce of Portland, and (2) to provide and operate dry-dock facilities necessary to make Portland a deep-shipping center.

Up to now, most of the Port's facilities have been scattered down at St. Johns, about 1½ miles downstream from Swan Island. The agency operated two ancient timber dry docks, one 42 years old, and one 48 years old in much better shape. The Port plans to install this better dry dock at the new pier, along with a steel dry dock which belongs to the U. S. Navy but which the Port can operate. The Port of Portland also acquired from the Defense Plant Corp. in 1947 the remainder of Kaiser's ship-construction facilities, including 5 full-revolving gantry cranes and access to the Navy's 14,000-ton dry dock.

Maritime business is now so heavy that it may even be necessary to keep the old dry docks in service for a while at least. The Port only provides the facilities, it should be emphasized. Ship owners arrange for ship-repair contractors and for the work on their vessels.

Completion of the consolidated facilities at Swan Island will centralize everything in one location, thus reducing the cost of administration as well as speeding up repairs for ships which use the Port's facilities.

Personnel

The job is sponsored by the Portland district office of Guy F. Atkinson Co. with Harry H. Hunt as District Manager, Joe McNabb as Project Engineer, and Lee Cox as Superintendent. Joe Lawrence is the Concrete and Forming Superintendent, and William Clough is Office Engineer. Robert McKee is Carpenter Foreman and Jimmy Fillebrown is Job Office Man.

Supervision of the engineering force of Frederick R. Harris is being conducted by Resident Engineer Hal W. Hunt, well known in the ASCE, Moles, and in construction organizations.

The Port of Portland has as its General Manager John J. Winn, Jr.

Data on Steel Scaffolding

A new 20-page catalog describes the complete line of tubular steel scaffolding and equipment made by Bil-Jax, Inc., Archbold, Ohio. It gives information on how to set up and dismantle the rolling, fixed, and swing types of scaffolds. Laboratory load tests and suggestions for maximum safety are also included.

This literature may be obtained from the company. Or by using the Request Card at Page 18. Circle No. 799.

Okla. Highway Head Dies

Robert Biles, Chairman of the Oklahoma State Highway Commission, died last month. He had served as Vice Chairman and Secretary prior to his appointment last spring. Joe Curtis, former Vice Chairman, succeeds him.

How to cut a time schedule 25%

The Skousen-Hise Contr. Co. of Albuquerque is cutting a new four-lane highway for U. S. 66 through New Mexico's Tijeras Canyon. So far they've also cut their time schedule for the job a full 25%.

One reason for this amazing record is the "Caterpillar" equipment on the job: a D13000 Diesel Engine in this Northwest Shovel, six D8 Tractors, a D7 and a D6 Tractor and two No. 12 Motor Graders.

The D13000 Diesel Engine in this shovel has been going almost constantly since 1938. On this highway job it's helping to move a million yards of granite rock—the kind of rough duty it was designed and built to handle. For this Diesel was built with care: its "wet" type cylinder liners, for instance, are Hi-Electro hardened, then chemically treated to assure smooth break-in with the rings. And like all 12 sizes of "Cat" Diesel Engines, it runs on low-cost, non-premium fuel without danger of fouling.

"Caterpillar" Engines are available in machines built by the leading equipment manufacturers. So take a tip from the experience of Skousen-Hise: cut your own work schedules by specifying "Caterpillar" power in the equipment you buy.

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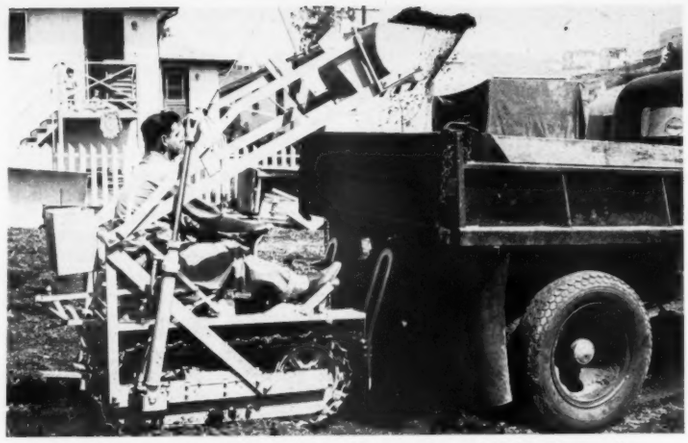
New Hydraulic Bucket

A new hydraulic front-end bucket has been designed for the long-track Agricat crawler-type tractor. It is marketed by Earl H. Pence & Co., Inc., 2150 Washington Ave., San Leandro, Calif.

The 5-cubic-foot-capacity High Lift bucket, mounted on the midget Agricat, is powered by a Vickers 1,000-psi pump which feeds into two rams having a pushing capacity of 491 pounds per 100 pounds of pump pressure, and a pulling capacity of 368 pounds per 100 pounds of pump pressure. The bucket lifts to a height of 72 inches from the ground level, and may be lowered 4 inches below track level.

According to the company, Agricat's new long track adds 8 inches to the previous 36-inch track length, and gives it stability in handling the High Lift bucket. The track is available in either steel or rubber.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 800.



The High Lift bucket for Agricat Midget tractors has a 5-cubic-foot capacity.

Ohio Site for New AEC Plant

At an expected cost of $1,200,000,000, the United States Atomic Energy Commission will construct a new gaseous-diffusion plant for the production of uranium 235 in Pike County, Ohio. The project is part of the new program designed to step up production of atomic weapons by 4½ to 5 years. Potential availability of water and power at reasonable cost were important factors in the selection of the site, a 6,500-acre tract some 22 miles north of Portsmouth, Ohio. Fifty families now living on the land will be relocated with the aid of the Commission and other Federal agencies. The Corps of Engineers, Department of the Army, is handling the acquisition of the site.

Operation and construction of the plant (the latter expected to take about four years) will be under the direct supervision of a new Portsmouth Area Office, established by the Oak Ridge Operations Office of the AEC. Kenneth A. Dunbar will be Area Manager, and R .H. McCulloh, Deputy Area Manager. The principal construction contractor is Peter Kiewit Sons' Co., Omaha, Nebr. Various phases of design and architectural work will be handled by: Union Carbide & Carbon Corp., New York, N. Y.; Giffels & Vallet, Inc., Detroit, Mich.; Sargent & Lundy, Chicago, Ill.; Singmaster & Breyer, New York, N. Y.; Smith, Hinchman, & Grylls, Inc., Detroit, Mich.; Burn & McDonnell, Kansas City, Mo.; and Holabird & Root & Burgee, Chicago, Ill.

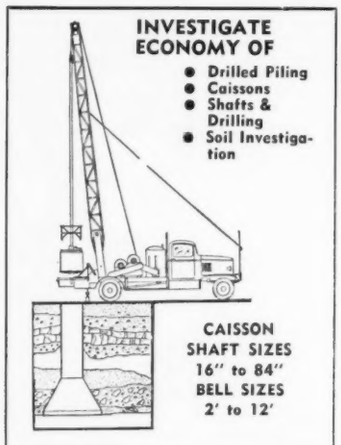
A plant housing the gaseous-diffusion process (designed to separate fissionable uranium 235 from non-fissionable uranium 238), operates with no more than normal industrial hazards, as has been proved at Oak Ridge, Tenn., where a similar plant has operated for six years without a single radiation casualty.

Welding and Cutting Units

A bulletin on its line of welding and cutting units is offered by Victor Equipment Co., Welding Equipment Division, 844 Folsom St., San Francisco 7, Calif. It illustrates and gives complete price data on light and heavy-duty sets, cutting tips, and welding nozzles.

This literature may be obtained from the company by requesting Bulletin 330, or by using the Request Card at page 18. Circle No. 765.

Convention dates are listed on page 2



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An outstanding advantage of Allison TORQMATIC DRIVE is that it gives the operator *positive control of the load at all times*—an important time and moneysaving feature in setting steel girders and beams.

With TORQMATIC DRIVE, the operator can "inch" loads into place without clutching, declutching or friction braking. *He controls the load with the throttle!*

This combination torque converter and fluid coupling gives all kinds of heavy-duty construction equipment greater smoothness and operating ease. It starts big loads easier and moves them faster. It cushions shock loads—reduces wear and tear on engines and equipment. It cuts operator fatigue—*gets more work done in less time at lower cost.*

Now successfully working in trucks, tractors, hoisting machinery and all kinds of earth-moving equipment, Allison TORQMATIC DRIVE is ideal with heavy-duty engines delivering 75 to 350 horsepower. For full details, write:

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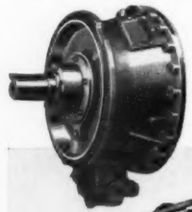
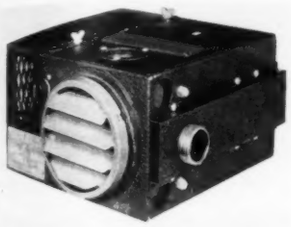


Allison TORQMATIC DRIVES

SCRAPERS TRACTORS TRUCKS SHOVELS LOCOMOTIVES DRILLING RIGS

New Manifold System For Gasoline Heater

A gasoline heater for either diesel or gas-powered trucks and tractor cabs has been improved by a new manifolding system, announces Hunter Mfg. Co., 1550 E. 17th St., Cleveland 14, Ohio. The new manifold on the UH47 exhausts combustion gases at any point desired within a radius of 12 feet from the heater, as compared with a previous limit of 30 inches. Thus gases may be exhausted to the outside of the vehicle at either side, top, bottom, front, or rear. The new manifold permits efficient operation of the heater without use of the exhaust cap.



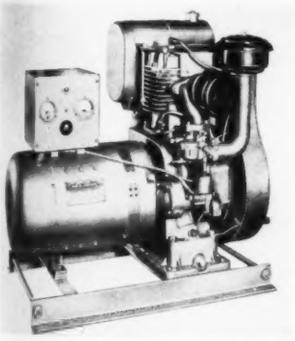
The gasoline-burning heater operates entirely independently of the vehicle engine, providing full heat delivery under thermostatic control at all times. It eliminates the costly engine idling required for the provision of hot-water heat during off-the-road and layover periods. It burns any type of gasoline, averaging less than one pint of fuel consumption per hour.

Subzero starting is said to be assured by the constant ignition and sealed-in-steel combustion. The heater may be fueled direct from the vehicle tank by electric pump or equipped with its own fuel tank for use with diesel engines. Constant circulation of warm air at any temperature desired is maintained by an electric blower fan. Controllable heat range is 5,000 to 15,000 Btu per hour.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 782.

A Generating Plant

An electric generating plant supplying 3,000 watts ac or 200 watts dc is made by Pioneer Gen-E-Motor Corp., 3841 W. Dickens Ave., Chicago 39, Ill.



The WA-30 operates on 115 volts and is powered by a one-cylinder air-cooled engine. It operates at 1,800 rpm and weighs 490 pounds.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 801.

Air-Entraining Agent

A new folder on Vinsol air-entraining agent is available from Hercules Powder Co., 915 King St., Wilmington 99, Del. It lists the advantages of air-entrained concrete and the methods employed in its production.

A series of questions and answers in the leaflet covers the use of neutralized Vinsol solution. Although Hercules does not supply this solution, it may be obtained from companies in all parts of the country. The folder lists these suppliers and points out that Vinsol meets all ASTM and Federal specification requirements for air-entraining agents.

This literature may be obtained from the company, or by using the Request Card bound in at page 18. Circle No. 842.

New Field Service for A-C

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has organized a field group to provide customers of the company's General Machinery Division with faster and more efficient service. The new group,, under the direction of C. W. Schweers, Vice President and Director of Sales, will handle all service, repairs, breakdowns, and adjustments in the field. Regional service supervisors are: B. F. Ureda—Chicago (midwest region); A. S. Hill—Cleveland (central region); D. T. Thomas—New York (empire region); C. P. Suykerbuyk—Atlanta (southeast region); E. G. Kime—Dallas (southwest region); and D. W. Seagrave—San Francisco (Pacific region).

Delivery and erection of new equipment, major overhaul jobs, special service work, and major repairs requiring special skills or long-period manpower assignments, will continue to be handled from Milwaukee.

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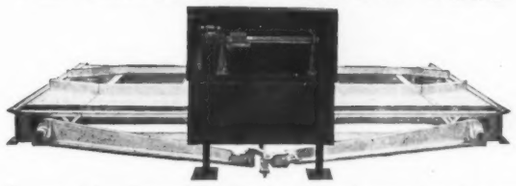
"THE CONTRACTORS' SPECIAL SCALE"



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NEW Cedarapids Built by IOWA Schrock Motorized HEAD PULLEYS

SIMPLIFY EVERY BELT CONVEYOR AND BELT-BUCKET ELEVATOR INSTALLATION

IT'S COMPLETELY DIFFERENT FROM CONVENTIONAL CONVEYOR DRIVES

Everything is contained **INSIDE** the pulley!

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WHAT A *Motorized* HEAD PULLEY IS

THIS is a revolutionary departure from the conventional types of conveyor drives. A *motorized* head pulley is a fabricated steel pulley with *everything*... electric motor, reduction gears and all moving parts . . . contained inside the drum! It's simply a new application of the long-proven gear reduction drive, and because of its simplicity, it's the answer to the maintenance man's prayer. 70% to 90% of conveyor down time is saved by eliminating all countershafts, speed reducers, sprockets, chains, Universal shaft drive and other parts necessary with conventional pulley drives. Motorized Head Pulleys are simple to install and flexible in use, completely interchangeable and adaptable to all types of belt and belt-bucket conveyor installations. By means of a simple adapter, a single pulley can be utilized in any of several belt locations, operating various widths of belt, or changing from larger or smaller horsepower. Pulley sizes range from 5 to 30 HP and are available in various widths. A Motorized Head Pulley is safe, because there are no sprockets, chains, jack-shafts, V-belts, etc. to endanger personnel. It's compact...requires no more room than a conventional pulley. Complete protection from weather, grit and dirt also reduces maintenance. Cedarapids Schrock Motorized Head Pulleys have been job-tested for many years under severest working conditions.

HOW IT WORKS

The pulley shell rotates about the electric motor, which is held stationary by means of a torque arm attached to the conveyor frame. The speed of the shell depends upon the combined reduction ratio of the various pinions and gears contained within the pulley shell. This reduction starts with a primary pinion mounted on the motor shaft and ends in the ring gear attached to the shell. The shell in turn then drives the conveyor belt. Leads to the motor enter the head pulley through a hollow conduit passing through the drum end bell and bearing. A simple oil bath gear compartment provides a lubricating bath for the reduction gears and front motor bearing. Motor and head pulley are cooled and ventilated by holes in the drum.

GET COMPLETE DETAILS TODAY

Find out all the advantages of converting your conveyor installations to motorized efficiency before you need head pulley replacements. One internationally known company has 50 Motorized Head Pulleys installed on widespread conveyor operations, and plans more for every installation that requires replacement. Get complete details about every feature. See your distributor today, or write direct to Iowa Manufacturing Company.

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Airport Is Improved For Military Flying

Contractors Rush Runway Extension, Taxiway, Alert Aprons, And Hangar; Lay Both Rigid and Flexible Pavements

• LAST season the Burlington Municipal Airport in northern Vermont was the scene of high-tempo construction activity as a bevy of contractors hurried to complete large-scale improvements permitting greater use of the field by military aircraft. The work was a U. S. Army Corps of Engineers project under the supervision of the New England Division. Fay, Spofford & Thorndike of Boston, Mass., was architect-engineer on the design, and Peter Salvucci of Waltham, Mass., was the general contractor on all but the building work.

Salvucci's contract in the amount of approximately $1,700,000 covered essentially the grading, drainage, and paving for the construction of aprons, taxiway, and runway extension, involving both rigid and flexible-type pavements. Only 120 days were allotted for the project, and Salvucci met the deadline substantially by spreading the work among several subcontractors and maintaining a 12-hour-day 6-day-a-week schedule through most of the job. Operations at the field got under way in July, 1951.

Burlington Municipal Airport, a port of entry into Canada, is used both by commercial airlines and a National Guard flight unit. A new administration building was completed in 1949, along with extensive taxiway, runway, and apron improvements. (See C. & E. M., July, 1949, pg. 1.) The new facilities will also enable jet fighters to use the field as a base.

7,000-Foot Runway

The field has a triangular runway pattern consisting of north-south and east-west runways, 3,600 feet long, connected to a northwest-southeast runway. The latter was also originally 3,600 feet, but had been extended at the northwest end to 5,000 feet. Under this latest contract it was extended further in the same direction to a length of 8,000 feet. However, this runway is officially classified as a 7,000-foot runway with a 1,000-foot paved overrun section at the southeast end, also a 1,000-foot unpaved overrun section at the northwest end. All runways are 150 feet wide and have flexible-type blacktop pavements. They pitch from the center line on a 1.5 per cent slope, and are flanked by 200-foot shoulders.

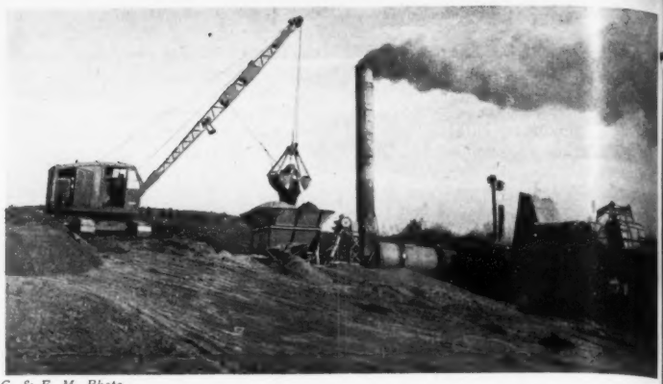
C. & E. M. Photo

Subcontractor Joe Mingolla (left) poses with Ralph Salvucci, son of and Project Manager for . . . . Contractor Peter Salvucci of Waltham, Mass.

To the right of the runway, and 775 feet between center lines, is the new taxiway that serves the extended runway. Also paved with a 3-inch 2-course bituminous-concrete course, the 50-foot taxiway is flanked by 50-foot shoulders. It extends 4,500 feet from the bituminous-paved apron of the National Guard facility to the northwestern end of the long runway. A 510 x 350-foot addition was made to this apron.

Two new alert aprons, each 100 x 332 feet, are located at the southern end of the field below the east-west runway. They are the rigid type, paved with plain concrete, and are at the sides of the new hangar. The hangar is a Butler metal building erected under a separate contract by St. Paul Construction Co. of Boston.

From the alert aprons, a 50-foot bituminous taxiway connects with the east-west runway. The taxiway makes



C. & E. M. Photo

A Koehring 303 crane drops sand into the receiving hopper of a Cedarapids PA asphalt plant on the Burlington, Vt., Municipal Airport job.

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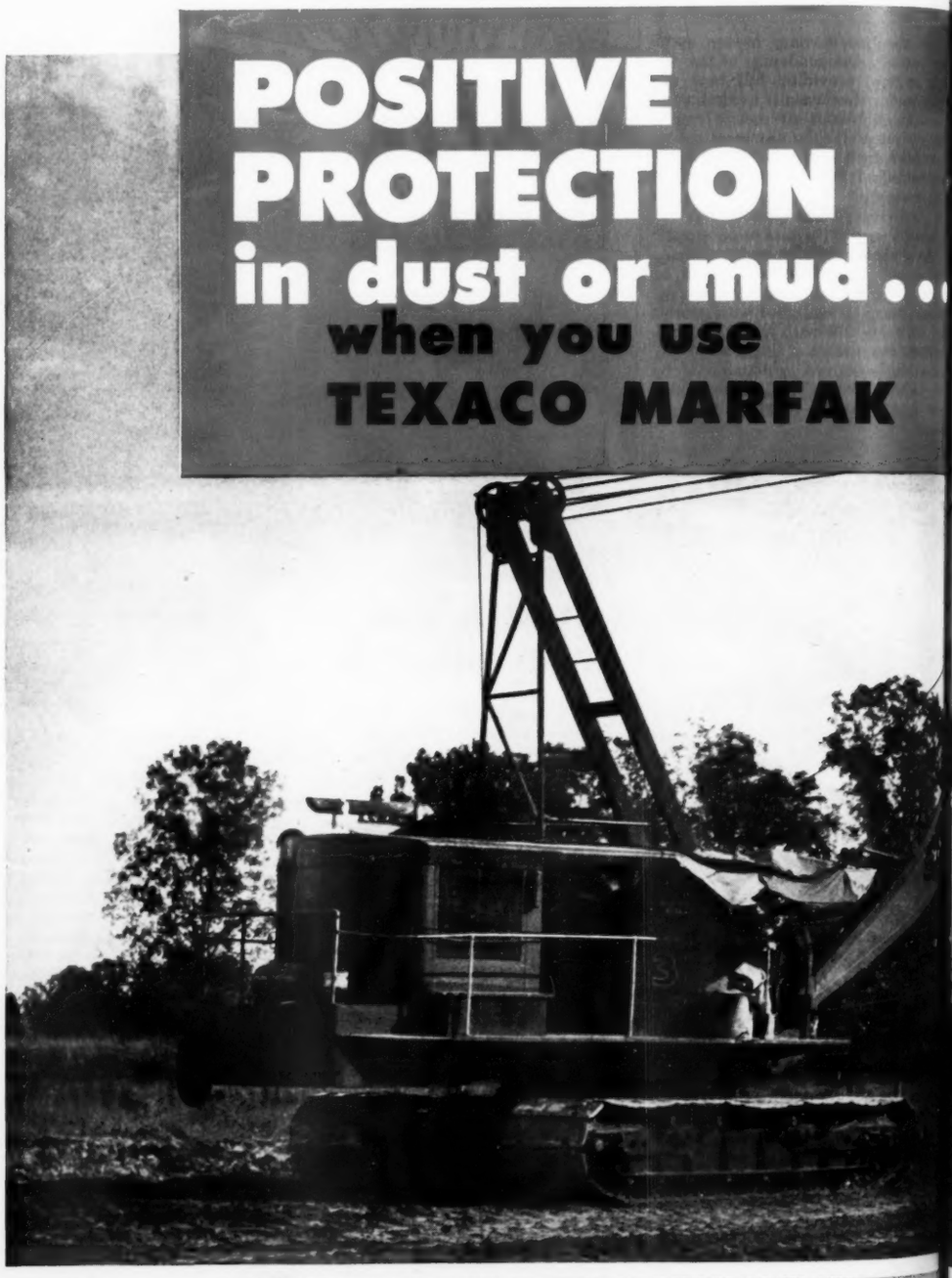

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See newspaper for
time and station.

TEXACO

TEXACO

The Lorain L820 shovel on the extreme left is one of a team of eight Lorain excavators Peter Salvucci used for the grading on Burlington Municipal Airport

a three-quarter loop around hangar and aprons and is about 1,000 feet long.

Sand Drains Required

A quick start was made on the construction when the Eastern Tree & Landscape Corp. of Dedham, Mass., put 100 men to work clearing some 160 acres under the first subcontract. By July 15 the site was opened up sufficiently for grading to start. Excavation totaled 1,770,000 cubic yards of unclassified material, of which about 130,000 yards involved the removal of a rocky knoll at the southeast end of the field to improve the glide-angle approach zone. Ledge rock from this maximum 35-foot cut was used for fill in the alert-apron area.

Drilling and blasting of the rock was done by Hemlock Construction Co. of New York, working two shifts and using 12 wagon drills powered by seven 500-cfm air compressors. Average rock haul was 2,000 feet. The rock was hauled and loaded by D. V. Frione & Co., Inc., of New Haven, Conn.

An unusual feature of a job in this area was the installation of 6,000 linear feet of sand drains, which was done by George M. Brewster & Sons, Inc., of Bogota, N. J., in five working days beginning August 9. The drains were deemed necessary to drain an area made up of peat and silty sand where a 70-foot fill was required in the taxiway construction. A total of 99 drains was installed, mostly 60 feet in depth, but with some going down 95 feet. Average spacing was 50 feet. For the installation Brewster used a Manitowoc 3500 Speedcrane equipped with an 80-foot boom and 124-foot steel leads. Mandrels were driven by a McKiernan-Terry 11-B-3 hammer powered by air which was supplied by a battery of three Le Roi 500-cfm compressors mounted on a low-bed trailer.

Methods used were similar to those used by Brewster on the New Jersey Turnpike. (See C. & E. M., Dec., 1950, pg. 21.)

Grading

In general, the taxiway area was mostly fill and the runway area was mostly cut. Outside the rock sections the soil was sandy, and in order to maintain suitable haul roads the contractor mixed in some loam to stabilize the sand. Salvucci had seven 2-yard Lorain excavators on the job—shovels or draglines—and one 1-yard Lorain machine. Hauling equipment for the average 1,000 to 1,500-foot hauls included 22 bottom-dump and 3 end-dump Euclids, together with 3 LR and 4 LJ Mack trucks.

For the shorter hauls he used 7 tractor-scraper combinations consisting of 3 International TD-24's with Caterpillar 80 scrapers, and 4 D8's with LeTourneau Carryalls. Dozers included 2 D8's, 4 D7's, 3 TD-18's, and an Allis-Chalmers HD-14. Compaction was achieved by a 4-wheel Bros rubber-tire compactor with a 30,000-pound wheel load, pulled by an HD-20 tractor. Final shaping was done with three Austin-Western motor graders. Drainage was handled with a Bucyrus-Erie ¾-yard crawler crane and a Lorain truck-crane.

D. V. Frione & Co. subbed part of the grading item, on which it employed three 2½-yard shovels and a fleet of 17 Euclids—6 end-dumps and 11 bottom-dumps—for dirt-moving. Dozing and leveling was done with three D8's, one TD-18, and a Caterpillar motor grader. At one time the two contractors on the excavation had 120 pieces of heavy earth-moving equipment at work. Grading was completed on October 12.

Bituminous Paving

Before the grading was finished, the

(Continued on next page)

Don't let dust, mud and moisture get in their "dirty work" on your equipment. Keep them *out* with *Texaco Marfak* — the tough, longer lasting chassis lubricant that *stays in* the bearings in spite of jolts, heavy loads and road splash. *Texaco Marfak* prevents rust, minimizes wear, prolongs the life of parts, reduces maintenance costs.

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For engines, heavy duty gasoline or Diesel, use *Texaco Ursa Oil X***. This fully detergent and dispersive oil cleans as it lubricates and has extra resistance to oxidation. Reduces fuel consumption and maintenance costs.

For crawler track mechanisms, use *Texaco Track Roll Lubricant*. It protects against dirt and moisture, guards against rust and wear, prolongs the life of parts.

Ask your Texaco Lubrication Engineer about the Texaco Simplified Lubrication Plan that lets you handle *all* your major lubrication with *only six* Texaco Lubricants. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:
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C. & E. M. Photos

Surfacing the runway. Left, a Barber-Greene finisher; right, a 5-yard Rex Moto-Mixer on an Autocar discharges the mix while a Jackson vibratory screed is pulled over the surface

Airport Is Improved For Military Flying

(Continued from preceding page)

7-inch gravel base course was taking shape as a foundation for the flexible-type pavement totaling 114,300 square yards. The bituminous-concrete work was handled by Bayer & Mingolla Co. of Worcester, Mass., which set up a Cedarapids FA 50-ton-per-hour batch-type asphalt plant on the job site. The aggregate bin was charged by a Koehring 303 crane.

A fleet of 17 trucks hauled in the gravel for the base from nearby pits. It was spread by the graders and compacted by a pair of Buffalo-Springfield 12-ton 3-wheel rollers. The base was then primed with RT-5 tar applied at the rate of 0.3 gallon to the square yard before the 3 inches of bituminous concrete were laid. Plant-mix was put down by a Barber-Greene finisher in two courses—a 1¾-inch binder and a 1¼-inch surface. Rolling was done by two Galion tandem rollers, a 5-ton and a 10-ton machine, with the light roller making the initial pass. The surface was given a bituminous-sand seal coat.

Concrete Paving

Two contractors worked on the 7,800 square yards of plain-concrete paving comprising the alert aprons. Material was supplied and delivered to the forms

•COMPRESSIBLE—NON-EXTRUDING

•95% RECOVERY AFTER COMPRESSION

Ideal for joint filling in flood walls, outlet works and spillways, sewage treatment plants, etc. Cork Joint Filler keeps joint filled at all times. Light color does not mar appearance of exposed concrete.

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Place your order now for winter requirements

Maintenance Engineers and Road Superintendents have found an answer to their need for a—

MORE RELIABLE • MORE READILY AVAILABLE • MORE ECONOMICAL maintenance mix in "KOTAL STOCKPILE MIX"

KOTAL STOCKPILE MIX IS:

MORE RELIABLE—because it can be used under all conditions with uniform high quality results. Wet or dry, hot or cold, Kotal Mix stays put, forming a tough, durable, permanent repair. The Kotal Stockpile Mix is varied to meet seasonal temperature conditions and the Kotal Process imparts greater stability, toughness, and water resistance.

MORE READILY AVAILABLE—because mix is stockpiled so that it is on hand at all times ready for loading even though mixing plants are closed.

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If you haven't yet used KOTAL STOCKPILE MIX, investigate the advantages and economies of this versatile material today.

Contact your Kotal Mix producer now for your winter requirements, or write to us for the name of your nearest supplier or for further information.

Kotal Company, 360 Springfield Avenue, Summit, New Jersey

by William Workman of Essex Junction, Vt., who set up a batch plant only 1½ miles from the job site. Ready-mixed concrete was delivered in three truck mixers—two Ransome 5-yard units on GMC trucks, and a Rex 5-yard Moto-Mixer on an Autocar. Air-entraining cement was used in the mix.

Paving was done by Beck & Bellucci of Barre, Vt., in 12½-foot lanes 10 inches thick. Transverse contraction joints are spaced at 25½-foot intervals, with a single expansion joint in the middle of each apron. The truck mixers discharged directly onto the subgrade, while the concrete was leveled off with a Jackson vibratory screed. A Jackson vibrator was used along the edges. One 332-foot lane, the length of the apron, was paved in a day. The surface was given a belted finish, and the concrete was cured by covering it with paper.

Personnel

At the peak of the construction, as many as 260 were employed at one time by all the contractors. Ralph Salvucci was Project Manager for his father, Peter Salvucci, general contractor.

C. H. Tilley was Resident Engineer on the Burlington Municipal Airport improvements for the U. S. Army Corps of Engineers. The New England Division of the Corps of Engineers is headed by Col. H. J. Woodbury, Division Engineer.

Highway History Book

How many motorists of today, as they speed comfortably along, give a thought to the ancestors of those smooth roads they take for granted? It is safe to say—not many. Such an attitude, however, is the result less of indifference than of lack of knowledge. There are many who will welcome the chance provided by the American Association of State Highway Officials to look back at the history of the public roads.

"Public Roads of the Past", published by the Association, tells the story of highways and their development from about 3500 B. C. down to the early 1800's—and a fascinating story it is. Attractively illustrated with marginal pictures, the book is made up of a series of articles which appeared in the American Highways magazine between 1944 and 1950 under the authorship of "The Old Roadbuilder". This same old roadbuilder now turns out to be Albert C. Rose, who writes a foreword to the new publication. Mr. Rose is Highway Engineer and Historian of the Bureau of Public Roads, and his pen name is appropriate enough, since he began his highway experience in the mule-and-scraper days. With the BPR since 1917, Mr. Rose has reached his present important position by sheer hard work, and constant study has made him an outstanding authority on highway history.

Do you want to know where the oldest road in the world is? Turn to Chapter III, and you will find that Asia Minor has it. Exactly how old it is, however, even Mr. Rose can't say, as an existing route was only given its name of The Royal Road in the sixth century B. C. Or are you interested in the golden age of coaching, with its eighteenth-century flavor—a century that produced Thomas Telford and John Loudon McAdam? And what about the rule of the road? Have you ever wondered why we, in common with most nations, keep to the right, while certain other countries (notably the majority of British Commonwealth lands) mysteriously observe the left-hand rule? When motoring in England your trip is likely to be a short one unless you remember that

"The rule of the road is a paradox quite
In riding or driving along;
If you keep to the left you are sure to be right;
If you keep to the right you'll be wrong."

Chapter XIV tells how this came about.

These are extracts picked at random from a collection of 21 chapters, each a complete article in itself. A full bibliography of Mr. Rose's sources is included. "Public Roads of the Past" may be obtained from the American Association of State Highway Officials, 917 National Press Bldg., Washington 4, D. C., at a cost of $3.00.

Public Works Appointments

E. Burton Hughes, former Director of the Bureau of Rights of Way and Claims in the New York State Department of Public Works, has been named Deputy Superintendent of Public Works. He succeeds Fred W. Fisch, who retired last August. Mr. Hughes has been in State service for nearly 24 years.

Mr. Hughes' successor as Director of the Bureau of Rights of Way and Claims is Paul G. Baldwin, former Senior Land and Claims Adjuster in the Department's District 9 Office, Binghamton, N. Y.—an office where he has been employed since 1925.

In the Department's Public Relations Bureau, Ruth A. Williams has been appointed Senior Publicity Agent. In this post she assists in highway and building activities and does related work in connection with various departmental publications.

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Dept. 7 — 12% more power 10 lbs. lighter weight

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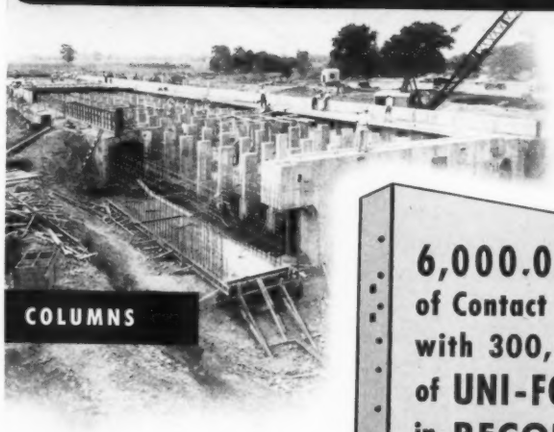

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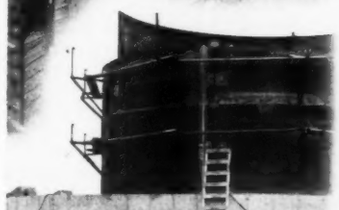

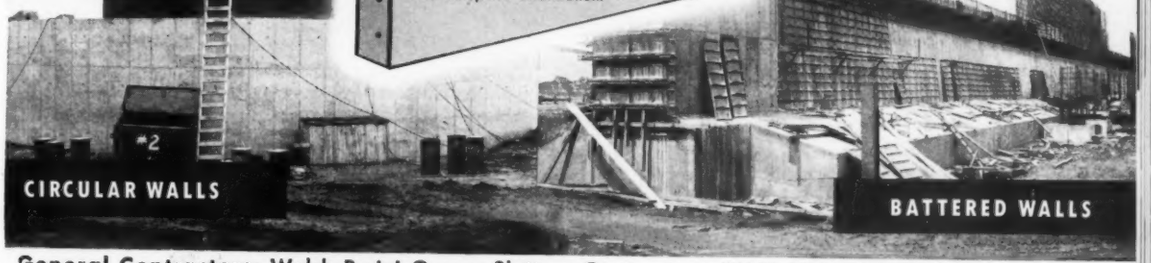

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Crusher and Screener For Military Building

A new type of crushing and screening plant designed specifically to meet military requirements for building highways, airfields, staging areas, advanced bases, and other military projects is announced by Iowa Mfg. Co., 916 N. 16th St., Cedar Rapids, Iowa. Cedarapids engineers worked in close cooperation with Army Engineers to design a plant which would meet the modern military needs of high capacity, minimum weight for extreme portability, and easy maintenance in the field.

Model DJ-50 is a three-unit crushing and screening plant for military building in the field. This Cedarapids equipment has a new dual-jaw crusher and horizontal vibrating screen with underslung mechanism. The plant is said to be 100 per cent portable at convoy speed.

Model DJ-50 is a portable three-unit plant, consisting of a crushing and screening unit, a single-screw fine-material washer, and a two-compartment bin and conveyor unit. The crushing and screening unit includes a dual-jaw crusher and a horizontal vibrating screen with the vibrating mechanism underslung to cut travel height to the minimum. All three units are 100 per cent portable for travel at convoy speed, the company says. Capacities range up to 50 tons per hour or more, depending upon conditions, and the plant produces two sizes of graded aggregate plus washed sand.

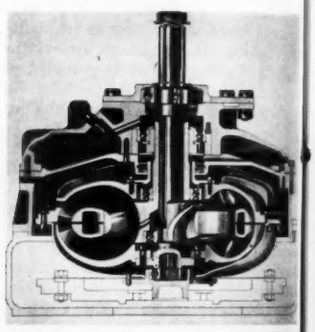
The outstanding feature of the Model DJ-50 is the use of a new dual-jaw crusher. It has two crushing chambers—an 18 x 40-inch primary, and a 6 x 40-inch secondary. Both are in one base with one eccentric shaft. The 6 x 40-inch crushing chamber takes the place of a roll crusher, with both primary and secondary crushing accomplished by one unit instead of two. The weight of the plant is materially reduced for greater portability, while the plant capacity remains high.

The dual-jaw crusher is said to be easy to service in the field, and especially in combat. Parts subject to high wear in abrasive material can easily be replaced with minimum labor and time. For example, the elimination of a roll crusher by combining primary and secondary crushing in one unit has greatly simplified secondary maintenance. There is no necessity for the time-consuming job of changing roll shells, a job requiring the labor of six to eight men and two to four days' time.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 750.

Converter Coupling

A new torque-converter coupling for reducing operator fatigue, the severe strain of start-and-stop, and that of heavy-load pickup is announced by the Fuller Mfg. Co., Kalamazoo, Mich. The converter coupling drives are bringing the advantages of torque converters to materials-handling equipment such as front-end loaders, tow trucks, cranes, lift trucks, and hoists.



During starting and pulling under load, the converter coupling automatically provides up to 2-to-1 hydraulic torque multiplication, eliminating shock load on all component units of the drive line, the company says. During converter operation, the reaction member is locked to the housing through an overrunning clutch—changing the oil direction so that the thrust reaction is taken by the housing. As the vehicle's load demand tapers off during normal running conditions, the new drive automatically changes to 1-to-1 coupling operation, providing maximum fuel economy wherever possible. This has been achieved by designing the vanes and housing so that the reactor, mounted on an overrunning clutch, is released and freed to rotate with impeller and runner when torque requirement slackens.

The converter coupling is said to be compact and easy to install. Model 12-A provides a flanged output and an S.A.E. No. 3 flywheel housing at the rear, permitting the installation of a second flywheel automotive clutch with the transmission. Model 12-S has a splined output shaft for straight-line drives with a universal joint.

The torque-converter coupling is designed to handle engines developing from 180 to 225 foot-pounds of torque at 2,000 to 2,200 rpm or higher.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 776.

A BIG NEW 30 TON MPH Moto-Crane

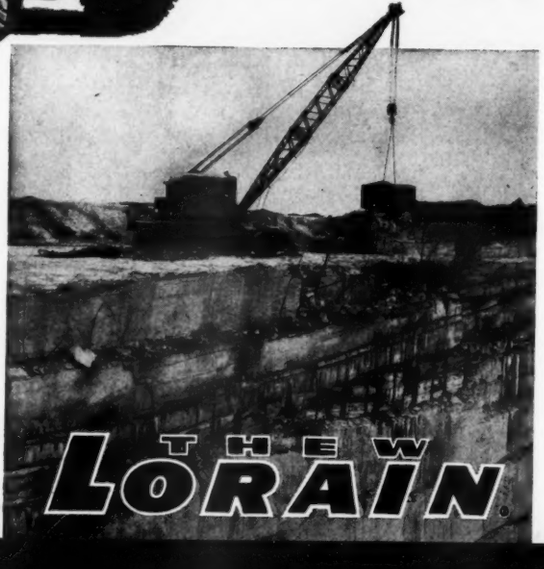
LORAIN MC-524

30 TONS lifting capacity — built "king-size" to do bigger jobs.

30 MILES PER HOUR — built fast to go farther, quicker and cover more scattered jobs.

FULLY CONVERTIBLE — as a crane, 1 yd. shovel, clamshell, dragline or hoe to serve more different jobs.

A bigger machine with bigger opportunities than ever before! Now you can do more—as well as go farther, faster—because the MC-524 brings greater capacity, greater liftability and greater profit possibilities to scores of jobs which never before could benefit from the advantages of a fast-stepping rubber-tire crane. This bigger MC-524 is an additional reason your Thew-Lorain Distributor can best meet your job needs. See him first for the facts!



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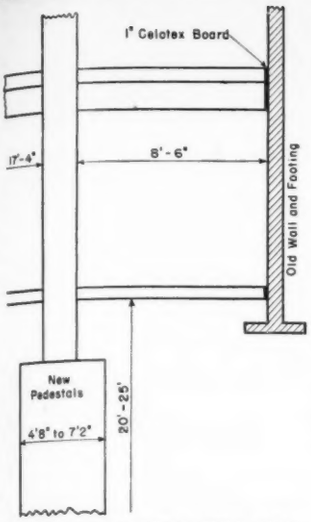

This diagram shows the position of the new cantilevered section that connects with a wing of the Stormont-Vail Hospital, Topeka, Kans.

Cantilever Design Avoids Underpinning

A good design can often anticipate field construction problems and eliminate them—or at least make them easier to work out. The design of an addition to the Stormont-Vail Hospital in Topeka, Kans., is a case in point, since it eliminated what might have been a difficult underpinning job.

The hospital administrators wanted the new building abutting the end wall of an existing wing of the hospital to connect with it by corridors. The specifications called for a four-story structure with subbasement, and provision for three additional floors at some time in the future. The architects designed a building shaped like an elongated X and adjoining the old building at the center of the X. It was to have a reinforced-concrete frame resting on pedestal footings.

C. & E. M. Photo

General Superintendent Dick Thompson (right) points out to Don Depew, of Griest & Ekdahl, the 1-inch separation between the new and existing sections.

Because of the size of the building, the footings had to extend 20 to 25 feet below the level of the basement floor of the old building. This presented a problem in the area where the new structure connects to the old. If new footings for an outside column line were dug along the line of the old wall, it would have to be underpinned and shored. The architects eliminated the problem by designing this bay as a cantilevered section.

The 12 x 24 and 14 x 24 reinforced-concrete beams extend out 8 feet 6 inches from the first column line to a vertical plane 1 inch from the existing building wall on all floors. Additional top steel in the beams ties them into the columns and a 17-foot 6-inch backleg. The cantilever design places the first line of footings far enough back so as not to reduce the soil support of the old wall and footings. Floor-slab thickness in this bay was reduced from 6 to 4½ inches to cut the dead-load weight on the cantilevered beams.

The contractor formed the floor with ¾-inch Plyform supported by 2 x 6 joists 16 inches on centers, 2 x 10 ledges 4 feet 6 inches on centers, and 4 x 4 timber shores 4 feet 6 inches on centers. The beam forms were 1 x 8 sheeting tied with strap iron and supported by 4 x 4 T-shores 30 inches on centers. A 1-inch creosoted Celotex board at the edge of the slabs and the ends of the beam forms insured the required separation between the old building and the new. A double metal stud partition placed on the new slab forms a double-wall construction at the building line. Metal-plate expansion joints were used at the corridor entrances.

The new structure will provide 225 beds and many additional facilities for the hospital. Scheduled completion date is March 1, 1953. Griest & Ekdahl were the architects of the new building; Finney & Turnipseed the consulting engineers—both of Topeka. The prime contractor is J. E. Dunn Construction Co., Kansas City, Mo. Don Depew and M. R. Surprenant are the architect's representatives on the job. Dick Thompson is General Superintendent for the contractor. Total cost of the completed addition will be about $3,000,000.

Rescoring Started for Perpetual Road Inventory

The New York State Department of Public Works has begun to rescore the several hundred miles of highway under its jurisdiction. This appraisal, following the Department's policy of keeping a perpetual inventory on the condition of the state's highways, is in conformity with the original study of highway needs made in 1950. At that time, the Department, together with the Federal Bureau of Public Roads, published its "Cooperative Highway Needs Study", in which every mile of state highway was studied with regard to structural, service, traffic, and safety considerations. The information thus afforded has been used as a basis for highway design and the programing of construction and reconstruction work.

Experienced engineers will rescore various routes selected on the basis of expected changes in rating from sufficient standards to deficient standards due to probable structural deterioration and traffic increases. This will be done each year so that deterioration can be detected in ample time to permit the Department to prepare plans and to schedule construction work before the existing investment in the highways is endangered.

This inventory of the New York Department is an ambitious one. To keep it up to date, every mile of highway will be reappraised and rescored every five to seven years.

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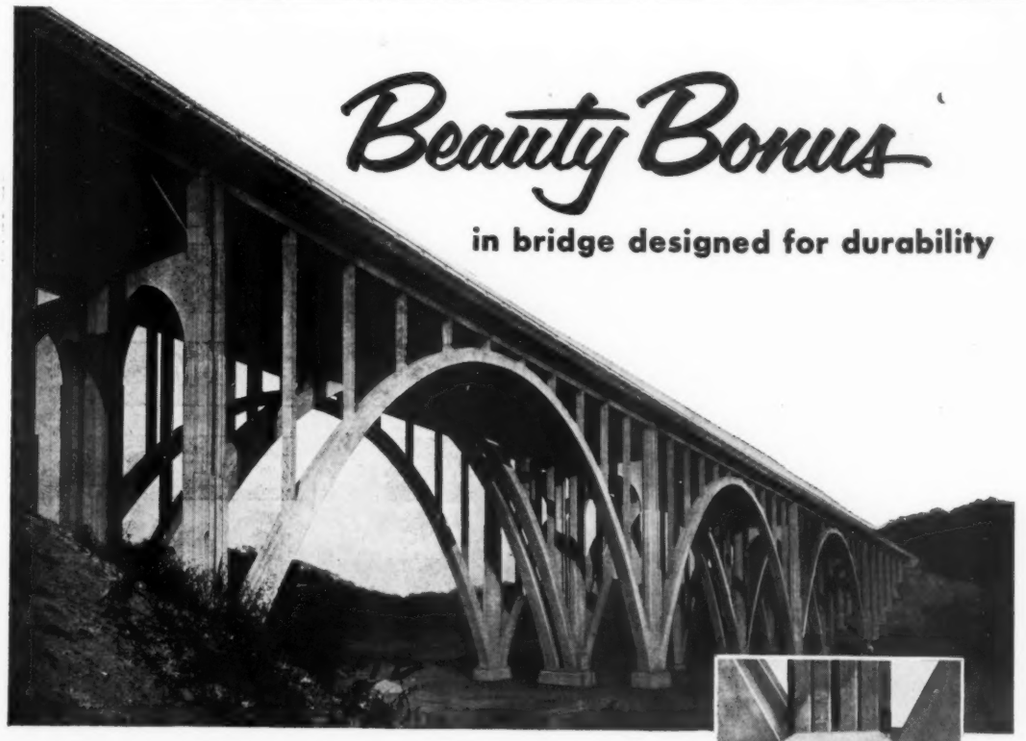

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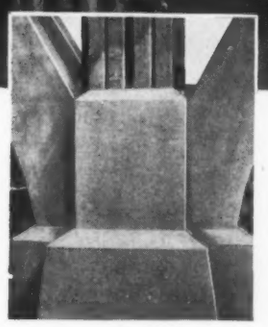

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There are more reasons why construction men like to build with Duraplastic. It gives a more plastic, more uniform, more workable mix that aids proper placement. That's why you'll want to specify Duraplastic on your jobs!

Yet, with all its advantages, Duraplastic sells at the same price as regular cement. Complies with ASTM and Federal Specifications. Your inquiries are invited. Universal Atlas Cement Company (United States Steel Corporation Subsidiary), 100 Park Avenue, New York 17, N.Y.

Superior surface appearance of concrete made with Duraplastic cement shows in this close-up view of an arch pier. Commercial Street Bridge, Penn-Lincoln Parkway, Pittsburgh, Pa. Designed by Pennsylvania Dept. of Highways. Contractor: Dinardo, Inc., of Pittsburgh.

OFFICES: *Albany, Birmingham, Boston, Chicago, Dayton, Kansas City, Minneapolis, New York, Philadelphia, Pittsburgh, St. Louis, Waco.*

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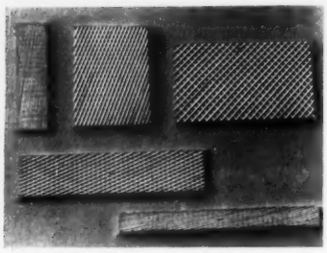


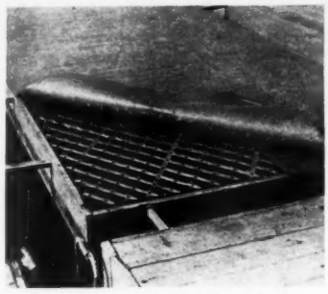
A single Rubora form can be adjusted to dimensions between 5 feet 8 inches x 1 foot 4 inches and 10 feet 4 inches x 9 inches.

Lattice-Type Form Adjusts Panel Size

Expansible concrete forms that can be re-used up to 100 times and can be adjusted to a number of panel sizes are offered by Kurt Orban Co., Inc., 205 E. 42nd St., New York 17, N. Y.

Rubora forms, which have been used in Europe to cut time and costs on cast-in-place concrete jobs, consist of wooden struts which are latticed together and hinged at the intersection points. After adjustment at the job site to the desired panel dimensions, the Rubora form is covered with Sisalkraft paper for rough finished work, or with a concrete liner of $\frac{1}{8}$-inch composition board for a smooth finish. The paper or board is easily tacked into place on the form, and is stripped off after the concrete has set, leaving the Rubora form clean and ready for reuse.

Type A form can be expanded to cover an area of 30 square feet (7 feet 5 inches x 4 feet 1 inch). This form can be adjusted to any set of dimensions between 5 feet 8 inches x 1 foot 4 inches and 10 feet 4 inches x 9 inches. Weighing only 50 pounds, it can be carried from storage point to job site by one man, and can be adjusted to the desired size by two men. Individual forms fit together evenly, and strip off after pouring without requiring the use of crowbars.



After adjustment to size at the job site, the form is covered with Sisalkraft paper or composition board before the concrete is poured.

For transportation and storage, Rubora forms compress to about a quarter of their maximum area.

In addition to their adaptability to various panel sizes, these forms can be curved for forming circular walls, thus eliminating the expenses of constructing circular wood forms. Other savings result from the fact that the crossed-beam action of the struts gives additional structural support which reduces the amount of shoring required by almost 50 per cent. For a 4-inch floor, support spacing can be as large as 28 inches.

Further information may be secured from the company. Or use the Request Card that is bound in at page 18. Circle No. 781.

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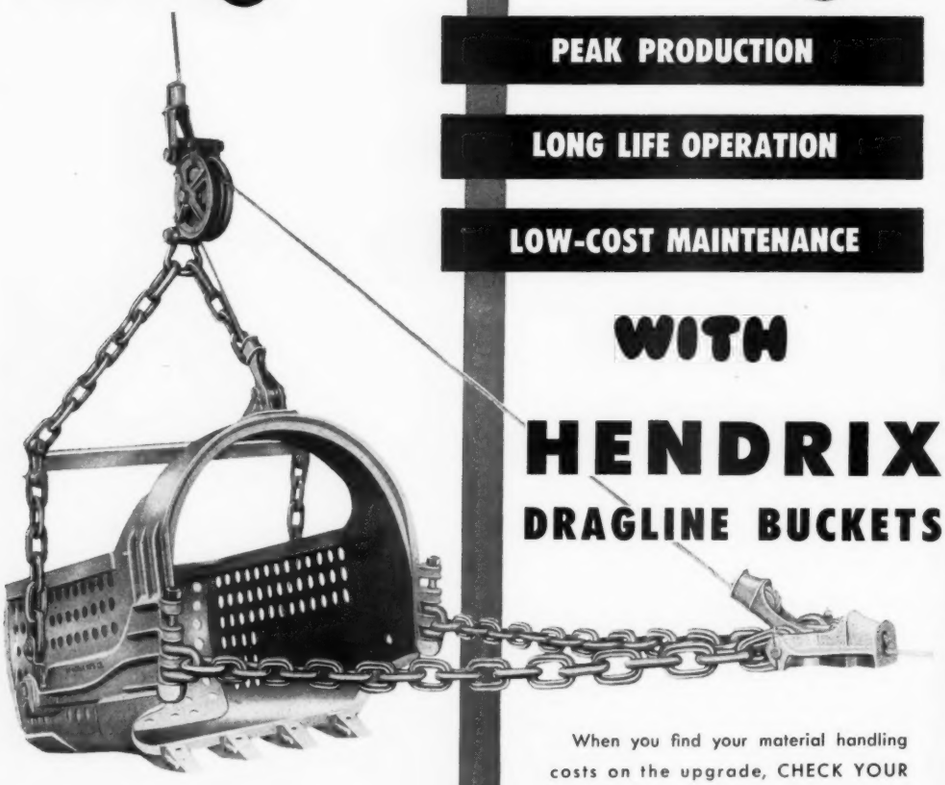

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For further information and literature on products described in this issue, turn to page 18 for the Red Request Card. Our Reader Service Department will be glad to help you.

Contractors and Engineers Monthly
470 Fourth Ave., New York 16, N.Y.

It Checks Your Spex For the Base Course

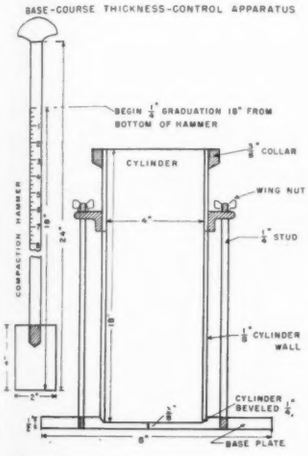
Engineer's Method of Controlling Thickness of Base Course Saves on Time, Money, and Personnel

• IN order to produce a base course of the specified thickness a contractor needs a simple method of control over his volume of road-building material, so that he will not have to add stabilizing agents or aggregates to correct a deficiency or excess. A. H. Freer, Bituminous Engineer of the Florida State Road Department, has developed such a method. It is simple, quick, and efficient, he says, and the apparatus can be made for about $10.

Mr. Freer has stripped this control method of all involved laboratory and field tests such as optimum moisture, Proctor density, in-place density, field-moisture content, and specified-compaction hammer drop. With his method, he says, the maximum time required is only ten minutes and an inexperienced inspector can conduct the test. The merits of this method, Mr. Freer says, are based on construction results rather than on lab-specified procedure.

Here is the method. For illustration, Mr. Freer has taken sand-bituminous road-mix as the type of base-course construction.

BASE-COURSE THICKNESS-CONTROL APPARATUS



Apparatus: This consists of three parts, as follows:

1. One metal cylinder, 18 inches long, 4 inches in diameter, the bottom of the cylinder beveled ¼ inch, and the cylinder wall approximately ⅛ inch thick. The cylinder has side lugs through which the base-plate studs are to pass.
2. One compaction hammer of the following dimensions: hammer head 2 inches in diameter, 4 inches in height, with a 24-inch shank graduated in ¼-inch increments beginning 6 inches from the top of the compaction-hammer shank.
3. One detachable 8 x 8-inch base plate with a thickness of ½ inch. The base plate has studs and wing nuts with which to secure the cylinder to the base plate.

Procedure: After sand-bituminous road-mix operations are started (the bitumized roadway material must be spread to the proposed pavement cross-section if mixing operations leave the processed material in windrows), the cylinder is forced vertically through the bitumized material into the unbitumized subgrade material. The material is then slightly compacted with the compaction hammer to insure its retention in the cylinder during withdrawal of the latter from the base-course material. The material in the cylinder is forced from it with the compaction hammer until all the unbitumized material has been removed from the cylinder; then the bitumized material is forced from the cylinder into a pan. The cylinder and base plate are then assembled and the bitumized material is compacted in the cylinder in three approximately equal lifts by 25 manual blows per lift with the compaction hammer (force being applied to the compaction hammer by the operator on the down stroke). The compacted base-course thickness which the uncompacted bitumized material will yield is read on the graduated compaction hammer shank where it intersects the top of the cylinder. Next, the depth of uncompacted bitumized material is measured at the test hole.

Illustration: Suppose a 6-inch base course is specified. After mixing operations are started, a base-course thickness test is made as outlined above. The compacted base-course thickness is found to be 5 inches and the uncompacted bitumized material has a thickness of 8 inches. Then the thickness of uncompacted bitumized mate-

(Concluded on next page, Col. 4)

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The new CP Trenchdril is a highly mobile, complete unit. Suspended from a tractor boom, and mounting two CP-70N Drifters for parallel drilling, it is a tremendous time-saver in ditching for oil and gas transmission lines.

Frame is of steel plate construction . . . exceptionally rigid . . . incorporates built-in receiver with drain plug and separate line oilers with individual shut-off valves . . . tubular cross members mount 4-inch saddles with 7-inch cone for greater stability.

Drill Carriages are identical to those used on the CP heavy-duty G-300 wagon drill . . . tubular construction . . . centralized controls . . . 91" feed travel; longer feeds available.

Drifters are CP-70N's — 4-inch drifters widely used because of their exceptional drilling speed, powerful rotation and hole-cleaning capacity.

Operates from CP Portable Compressor — a rugged unit that will follow a tractor anywhere.

Write for further information.

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Fiftieth ANNIVERSARY

The Hydraspeed Trencher mounts on a Case Model VAI tractor and will dig up to 12 feet of trench a minute. Be-Ge Mfg. Co., Gilroy, Calif., is the manufacturer.

Tractor-Mounted Unit Digs 5-Foot Trenches

A hydraulically controlled trencher that mounts on a Case Model VAI tractor is made by Be-Ge Mfg. Co., 885 N. Monterey St., Gilroy, Calif. The Hydraspeed will dig up to 12 feet of trench per minute and comes with a dozer blade for backfilling.

Bucket widths for cutting 12, 16, 18, and 24-inch trenches are used. The maximum digging depth is 5 feet. The unit's over-all height is 8 feet 11 inches, the width is 8 feet, and the length is 19 feet 10 inches. The conveyor assembly can shift the dirt to either left or right of the trencher. The Hydratrans fluid motor regulates the digging speed through direct chain drive to the rear tractor wheels.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 802.

Data on Fork-Lift Trucks

A bulletin on fork-lift trucks for high or low stacking is issued by the Buda Co., Harvey, Ill. It shows both diesel and gasoline models with truck capacities from 3,000 to 7,500 pounds.

Features of the FT series are: the hydraulic pump at the front of the engine for easy servicing; all-roller steel masts; a quick-change clutch located under a removable floor plate; and a parking brake lever with an adjustable knob handle to compensate for wear on the brake lining. The bulletin also points out that the trucks have reinforced welded-steel frames, center-point automotive-type steering, and shockless cushioned steer axles.

All models will turn in narrow intersecting aisles, according to the bulletin; a choice of lift heights is available.

This literature may be obtained from the company by requesting Bulletin No. 1570, or by using the Request Card at page 18. Circle No. 745.

New Director for Pioneer

Eugene C. Bauer, Jr., First Vice President of Kensington Steel Co., Chicago, Ill., has been elected a Director of Pioneer Engineering Works, Inc., Minneapolis, Minn. He succeeds Philip W. Moore who resigned last summer. Both companies are subsidiaries of Poor & Co., Chicago, Ill.

Checks Your Spec

(*Continued from preceding page*)

rial necessary to result in a compacted base course of 6 inches is determined by the formula $T = \frac{CA}{B}$, where T equals uncompacted-bitumized-material thickness required to give a 6-inch compacted base; C equals measured thickness of uncompacted bitumized material; A equals specified compacted-base-course thickness; and B equals compacted-base-course thickness determined as outlined above.

Substituting, then $T = 8.0\ \frac{6}{5} = 8.0 \times 1.20 = 9.6$ inches.

As it only takes ten minutes to make a complete base-course thickness determination by this method, the construction inspector is able to check rapidly on the volume of roadway material required to yield a sand-bituminous stabilized course of specified composition and compacted thickness.

Only Jackmanco contractor's barrows have these outstanding features! A low lift from grade, carrying more of the load over the wheel. Trays that are press-formed and have double folded corner construction, making them absolutely non-leakable . . . easy-pouring . . . extra-strong.
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Contractors and Engineers Monthly - Request Card - Oct. '52

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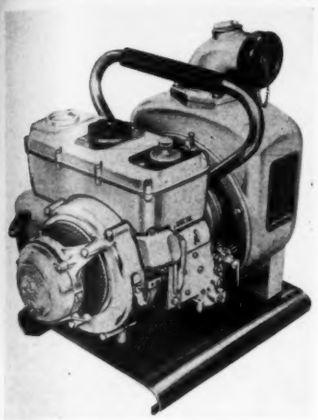


McCulloch's 7 FP gasoline-powered pump. It weighs only 57 pounds.

A Lightweight Pump

A new gasoline-powered pump has been announced by McCulloch Motors Corp., 6101 W. Century Blvd., Los Angeles 45, Calif. The new self-priming centrifugal 7 FP weighs 57 pounds complete, and has a capacity of 15,000 gallons per hour. It delivers water at pressures up to 100 pounds. It is equally effective in delivering fog, spray, steam, or foam.

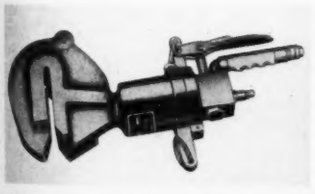
According to the company, 50 per cent of the weight has been cut off the conventional 15,000-gph pump, through use of a special lightweight engine utilizing high-pressure die castings. The 2-cycle engine develops 7 hp at 4,500 rpm. It is a modification of the engine on the McCulloch 7-hp chain saw.

Its starter is an automatic-rewind cable type. Lubrication is obtained entirely from the fuel mixture; no greasing or separate oiling is required. The impeller, which is a nonclogging design, is mounted on the engine shaft, eliminating bearings in the pump. Engine speed is controlled by a centrifugal governor.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 738.

New Hydraulic Shear

A new hydraulic shear that cuts 4x5/16-inch steel strip is manufactured by Manco Mfg. Co., Bradley, Ill. The Model S54-164E Guillotine has a 2-hp electric high-pressure pump unit with a 3-phase 220-440-volt 60-cycle motor. It operates by a choice of hand or foot valve control (foot valve optional at extra cost), and has 25 feet of connecting hose.



The company points out that models with capacities up to 18-inch strip will be available shortly. The shear weighs 65 pounds; the pump unit 400 pounds.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 736.

New Units for U. S. Plywood

United States Plywood Corp., New York, N. Y., has opened a new sales and distribution unit in Columbia, S. C. The branch, with its 20,000-square-foot warehouse, has offices and showrooms decorated with ten Weldwood products. It offers 24-hour delivery and serves the entire state, formerly covered from the company's branch at High Point, N. C. Albert M. Hill, Jr., Sales Representative at High Point, has been named Manager of the new branch.

Another distribution plant has been opened in Chicago South, Ill. Managed by A. W. Teichmeier, the new firm will serve the south side and suburbs of Chicago, east-central Illinois, southwest Michigan, and northern Indiana. The building, with an inside area of 35,000 square feet, includes offices, showrooms, storage area, and an inside railroad track, capable of handling two cars in the building with closed doors. Another company unit is located at 900 W. Division St., Chicago, Ill.

Electrode-Comparator Rule

A new 9-inch welding electrode-comparator slide rule which permits a comparison of General Electric welding electrodes with those of other electrode manufacturers is available at G-E welding distributors. Designated GEN-37B, the rule gives an electrode comparison in a matter of seconds.

This comparator may be obtained from the company, at 1 River Road, Schenectady 5, N. Y., or use the Request Card at page 18. Circle No. 778.

ASCE Honors Dr. Steinman

The American Society of Civil Engineers adopted a symbolic design for the official first-day envelopes to which its centennial stamp was affixed and postmarked September 6. The design showed the hands of an engineer working on plans for a suspension bridge. Below the photograph was a drawing of another suspension bridge, and above the hands was the quotation from John Ruskin: "Therefore when we build, let us think that we build forever."

The hands were those of David B. Steinman, New York City bridge designer of international renown. The two bridges shown were the Brooklyn Bridge, which Dr. Steinman recently reconstructed for increased traffic capacity, and the proposed bridge across the Narrows at the entrance to New York Harbor. The latter, Steinman's dream bridge, on which he has worked 25 years, is planned to be the greatest and most beautiful span in the world. With a clear span from shore to shore of 4,620 feet, it will be one of the world's outstanding achievements in engineering.

Officials of the ASCE said they were glad to adopt the design honoring Dr. Steinman out of recognition of all he has done in his profession, particularly in his work to help and inspire young engineers and engineering students.

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Huge Slides Halted By Hydrauger Holes

Moving Mountains Are Stopped Along Relocated Highway And Railroad at Big Dam in Central Oregon

• TWO years ago, over 5,000,000 cubic yards of muck was slowly sliding down into the relocated railroad and highway at Lookout Point Dam, in central Oregon. Last winter, even during the rainy season, the threatening material stayed where it was. Except for a few minor surface slides, the mass movement of a mountain had been stopped.

Credit for winning the fight against millions of tons of earth and rock goes to men of the Corps of Engineers, Portland District, who improved on the technique of drilling horizontal holes by the Hydrauger method to drain the sliding material and make it stable. What they have done has interested such world-renowned engineering consultants as Professor Arthur Casagrande, Hibbert M. Hill, and Julian Hinds, all of whom visited Lookout Point in consulting and advisory capacities to study the unusual problem.

In two years, about 9 miles of Hydrauger holes and drainage pipe has been installed, in spite of one of the most unfavorable drilling conditions a man could ask for. Loose talus, embedded in clay, has been successfully penetrated by a smooth horizontal hole because of the improved adaptation of the method.

Interesting Problem

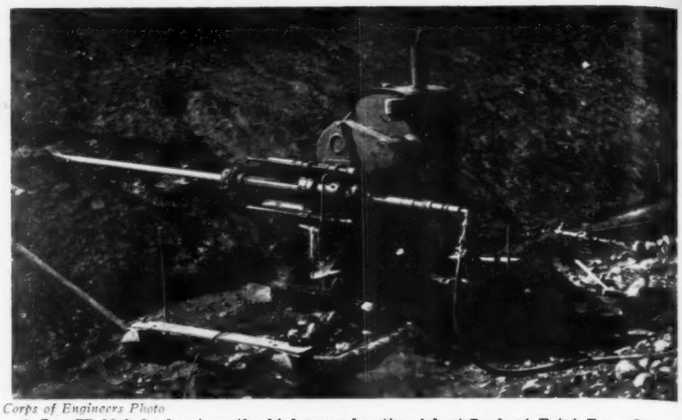
When the Corps of Engineers designed Lookout Point Dam and Reservoir on the Middle Fork, Willamette River, 23 miles upstream from Eugene, it was necessary to relocate 23 miles of main-line railroad, 13 miles of state highway, and 16 miles of secondary roads to bring these facilities up above the reservoir level at elevation 929. The only place to put the relocated facilities was higher up on the sides of the Willamette River gorge, and improvement of these thoroughfares to new standards called for major excavation work to shape the new roadbeds.

While the mountainsides in their natural state were fairly well in repose, it was tricky indeed to attempt to slice a path through the material with power shovels and grading equipment. The mountainsides were composed mostly of volcanic material—talus, clay, lava rock—all shot through with slip planes and water seams. The Lookout Point clay is a viscous, tight, sticky, impervious substance. Often, behind curtains of this material, great pockets of ground water formed under considerable hydrostatic pressure. Landslides in past geological ages, as the river cut its way down through this material, had formed all manner of slip planes. When new roadbeds for railroad and highway were cut along the toes of some of these slip planes, the mountains naturally started to move. Big slippages began to occur along the new routes which contractors had graded, even before the work was very far along.

The engineers were alarmed, but not surprised, because test holes drilled into some of the slopes prior to construction had shown a high water table in many places. Slippage of new slopes only served to confirm their worst fears.

Slopes Then Flattened

In an effort to hit on a criterion which would reduce sliding to the extent economically feasible, a minimum safety factor of 1.0 was adopted. It was fairly definite that the first slides were caused by water pressures. The slopes were then flattened, often at sizable excavation cost. In one deep cut, the slopes were laid back to a ratio of 4 to 1. When this bank began to give way along the toe, and the roadbed started to heave up along the center line, the engineers realized that slope flattening was not the answer to the problem. It was more than obvious that the excavation was disturbing nature's balance and old slides again became active.



Corps of Engineers Photo

A Joy CD-10 helped out on the highway-relocation job at Lookout Point Dam, Oreg. Here it is boring one of the water-intercepted holes into a highway slope.

Hydrauger Method Introduced

Down in California, the Division of Highways had recently run into the same problem in some of its super-saturated cuts on mountain roads, and was having considerable success with a method of drilling holes into the sliding material to drain the trouble-

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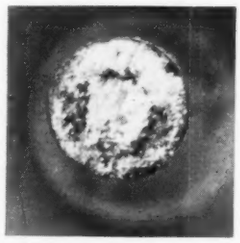
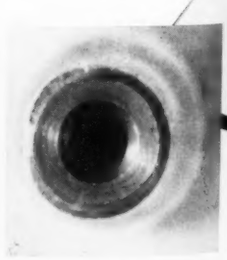
Here is a fuel pump, ruined by rust and corrosion taken from a 3-year-old car operated on ordinary gasolines.

Fuel pump cover, removed from 3-year-old car after 25,339 miles, shows no sign of rust or corrosion. Operated on Sinclair Anti-Rust Gasoline with RD-119.



Carburetor jet plugged with corrosion, taken from a 2-year-old car after 12,000 miles of operation on ordinary gasolines.

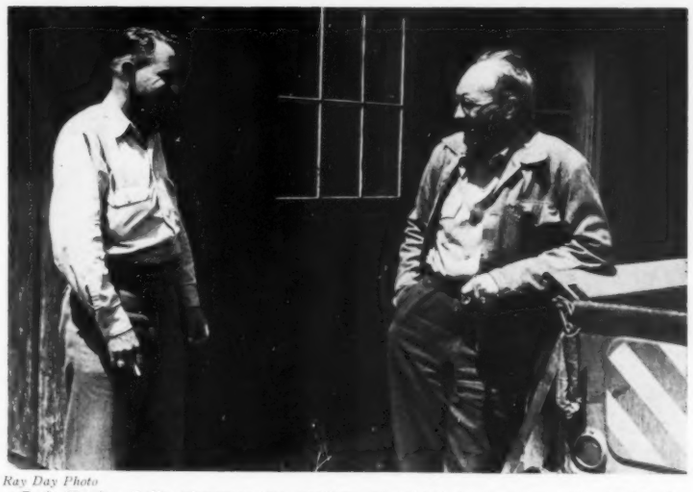


Carburetor jet on a 3-year-old car shows no rust or corrosion after 35,921 miles of operation using Sinclair Anti-Rust Gasoline with RD-119.

some water away. The Corps of Engineers decided to experiment, by hired labor and force-account methods, with the scheme used in the sister state to the south.

It was a rough adaptation of the method, however. A power auger was rented from the Oregon State Highway Department, which had adopted the California method. In conjunction with certain stone and gravel reinforcement work along the slope toes, this machine went to work. It was soon apparent that the conventional-type bit would not solve the problem, because it failed to penetrate more than 60 feet—not far enough back in most cases to reach the water pockets. The talus formation stopped this machine cold.

A Hydrauger drill was then purchased from the manufacturer. The machine, originally developed for laying small-diameter pipelines under city streets without disturbing the pavements, came to Lookout Point Dam equipped with a pilot bit, drill rods, a 5½-hp air motor with a hollow shaft and water feed, assembled on a ratchet device. An auxiliary finger bit was ordered also.



Ray Day Photo

Jack Newby (left) discusses the problem of drilled drain holes with Assistant Resident Engineer Thomas J. Waring. Together they experimented with the Hydrauger holes and made them work.

In ordinary material, the rig worked fine, and progress was good. But when the talus formation was encountered, the same difficulties were repeated. The talus raveled out against the drill bit. Drill rods, too, were too light. NX rods were adopted. Performance still was not what it should be.

One of the men in charge of field work had been raised in the south Texas oil fields, and he finally obtained permission to try a radically different type of drill bit. Some 4½-inch Hughes and 3⅝-inch Smith "rat bits" of the type common in oil-field drilling were brought in. Magically, the problem ceased to exist. The new-type bits penetrated the tricky talus with a slick hole to depths of 350 feet. Similarly, the bits penetrated clay, gravel, and all types of solid rock.

Refinements have now been worked out to improve even on the first successes. In addition to Hydrauger machines, Joy CD-10 and CD-20 drills are being used with good results. Bits have been reworked so that the shoulder between the bit and drill shank is no longer a weak point, and will no longer tend to hang up. The technique has now been perfected to the point where talus can be drilled and cased at the rate of 250 feet in 8 hours. Solid rock can be drilled and cased almost as fast. The deepest interception hole drilled to date was 362 feet deep, and combined drilling and casing costs have been lowered to 82 cents per foot, including drilling, casing, labor, and pipe.

How Drilling Is Done

Wherever possible, the crews try to probe for water seams by drilling exploratory holes tentatively located by geologists. Otherwise, they simply drill from the toe of the slope and angle the hole uphill toward visible signs of water. When water pockets under pressure and saturated slippage seams are found, the water is quick to flow. Flash interceptions of 150 gpm in a single pipe have been recorded.

The crews have learned one important trick: to case the holes promptly. If a freshly drilled hole is left for several days, talus raveling invariably starts, and it is then next to impossible to install the casing. In some instances casing has been used as a drill rod, washing out any material later on with a water jet. Both 2-inch and 1½-inch pipe, perforated for two-thirds of its circumference, has been used.

So far as visible results are concerned, they are real and definite. Countless slides have been stopped in their course. The winter of 1951-52 was a normal wet period, but with the exception of minor surface slides, there was no deep-seated movement of millions of cubic yards. Slopes which were wet all summer long 2 years ago have now dried up completely. One slide, which endangered a house, was averted.

But the most dramatic result was noted in a single slide involving 5,000,000 cubic yards of material. To stop this slide, the crews had desperately dug a 4 x 6 tunnel 900 feet back into the hill, and placed 150-foot laterals at right angles from the 450-foot point. Some water had been tapped, but in general the tunnel was not working out very successfully.

Rooms were then enlarged so that Hydrauger machines could be brought in. On the very first hole, where only 16 gpm had flowed before, 50 gpm was produced. Fan-shaped holes covering 270 degrees were then drilled. Within 48 hours, a nearby deep well used for unwatering the slope had dropped in output from 40 to 2 gpm, and the Hydrauger holes were draining all the

(Concluded on next page)

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Huge Slides Halted By Hydrauger Holes

(Continued from preceding page)

stored water out through the tunnel. That big slide has now been fully stabilized.

According to project officials, the pipes will often start flowing several days after an apparently dry hole has been drilled. Often, sizable pressure lakes are tapped directly, bringing a flash flow of water under pressure. So long as pipes have any flow at all, they tend to stay open. Officials believe that if the pipes ever plug up it will be relatively easy for maintenance crews to clean them out.

A drill crew consists of only two men, which is enough to produce the now satisfactory results. It appears at this time that extensive excavation costs can be averted on similar work, and that the highway and railroad relocations around Lookout Point Dam will function without excessive maintenance costs.

Dam Is Multiple-Purpose

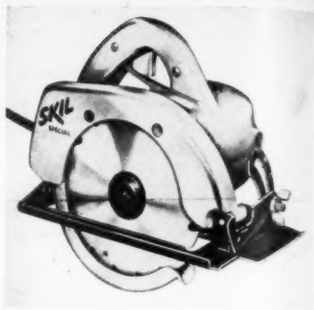
Lookout Point Dam, at the Meridian site near Lowell, Oreg., is the Corps of Engineers' principal unit of the multiple-purpose development ultimately planned for the Middle Fork Basin. Lookout Point Dam will eventually have a total power capacity of 115,000 kw in three generating units. Other features of the ultimate project include an auxiliary flood-control reservoir on Fall Creek, a storage reservoir and power plant on the middle fork of the Willamette at Hills Creek, a drawdown tunnel for utilization of natural storage at Waldo Lake during critical power years, and a re-regulating dam with power facilities at Dexter site about 3 miles below Lookout Point Dam.

Consisting of an earth-fill dam and concrete spillway, Lookout Point Dam will be 2,238 feet over-all, with 1,990 feet comprising the earth-fill section. Maximum height of embankment is 256 feet. The embankment will contain 7,400,000 cubic yards of material. The spillway, a concrete controlled-overflow affair, will pass 270,000 cfs in emergency flood periods. However, the total 456,000 acre-foot reservoir capacity is heavily earmarked for both flood control and power production.

A New Electric Saw

A new 6-inch portable electric saw has been introduced by Skil Corp., 5033 Elston Ave., Chicago 30, Ill. The Skil Home Shop Special Model 516 is powered by a universal-type motor. It has a 5,800-rpm speed and can cut wood, stone, metal, plastic, and composition. Built-in bevel and depth-of-cut adjustments allow quick easy adjustment, the company says. Vertical cutting capacity is 1⅞ inches and the capacity at 45 degrees is 1⅝ inches.

Model 516 is 10⅛ inches long and weighs 9½ pounds. Features include an automatic telescoping blade guard, aluminum-alloy housing, safety trigger switch, self-lubricating bearings, and



accurate sighting notches for following line of cut. An added feature is a special nonglare foot, which is said to cut reflection to a minimum.

The saw comes with a combination for general-purpose cutting, wrench, and 3-conductor rubber-covered cord.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 747.

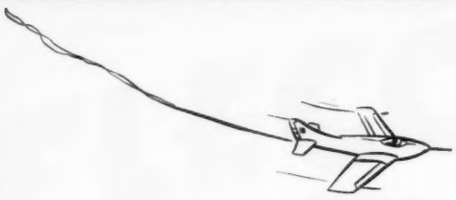
California's County Roads: Inventory of Highway Needs

Appreciating the interconnection of state highways, county roads, and city streets for a unified transportation service, California is examining the deficiencies in her county-road systems. Under the supervision of the County Supervisors Association of California, the Commissioner of each one of the 58 counties will make a report. A series of forms, tables, and maps has been designed to meet all the requirements and complexities of preparing such a survey.

The type of travel-way surface (with the mileage for each surface type) and the width of travel-ways (including shoulders) by types will be reported. Mileage will be divided into primary and secondary county-road systems. The inventory of critical deficiencies on primary roads will show the county identification number; length in miles; estimated average daily traffic; existing travel-way surface by type and width; reason for deficiencies; description of proposed improvement; and estimated costs of right-of-ways and construction. The same pattern will be followed in reporting on primary bridges and secondary roads and bridges. Each county will also prepare a map showing the state-highway, primary-county, and secondary-county systems in different colors.

When completed, the full report will be presented to the Senate Interim Committee on Highways, Streets and Bridges for their impartial review and then in printed form to members of the Legislature and other interested persons and organizations. *Local Roads*, a publication of the American Road Builders' Association, commends California for this progressive action. A nation-wide problem today is the county road that is "out of the mud", but not adequate to carry present-day traffic, says ARBA.

CLEARING FOR AVIATION



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V-8 Powers New Truck

A new heavy-duty truck powered by an 8-cylinder V-engine is announced by The Autocar Co., Ardmore, Pa. The C-85-T is made in 142 and 159-inch wheelbase lengths and is said to keep pace with traffic on hills and in getting away at traffic lights.

The 207-hp high-compression engine weighs 1,250 pounds, giving it the low ratio of 6 pound per horsepower. It is 43 inches long and has a 4¼-inch stroke. The large 4½-inch bore provides extra area for the stellite-faced valves in the head. Engine displacement is 540 cubic inches.

The new tractor has an all-steel driver cab with vision-maker curved windshield, elevated instrument panel, adjustable driver's seat, and room for three men.

Further information may be secured from the company. Or use the Request Card that is bound in at page 18. Circle No. 724.

Autocar's new model C-85-T tractor comes in 142 and 159-inch wheelbase lengths and is powered by an 8-cylinder high-compression V engine.

College Canvasses Young Engineers by Direct Mail

Though enrollment in college engineering classes has dropped about 18 per cent since 1948, Iowa State College has not felt it. The college has maintained an enrollment of engineering students almost as large as in post-war GI years. Direct mail has been the method used, and through this the college has informed Iowa high-school graduates of the need for engineers and has sold Iowa State as a good place to get the degree.

Each year the college mails a form letter and a series of pamphlets to high-school seniors and their schools. The letter invites the student to read the data and to come to the office of the Engineering Dean at any time for further information.

Among the various pamphlets is one entitled "The Most Popular Man on Campus". This man is the senior who is about to receive a degree in engineering—a person regarded by American industry as tops. The pamphlet explains that a career in engineering provides good pay and plenty of job opportunities. It can also be fascinating and satisfying to the student who is interested in such subjects as mathematics, physics, and chemistry, and is determined to get ahead. The various engineering fields provided by the college are listed, including aeronautical, architectural, chemical, civil, electrical, industrial, and mechanical engineering.

The campaign is backed by an understanding of the problems facing a boy graduating from high school today. Iowa State realizes that almost inevitably he has an immediate future with the armed forces, and besides looking beyond this future to a career, he must decide how best to serve his country. The college offers military training, and reserve and regular commissions may be earned on the campus.

Additional information on the school's direct mail work may be obtained by writing to Ned Disque, Information Service, Iowa State College, Ames, Iowa.

Minneapolis-Moline Promotes

Donald C. Steinhelber has been elected Secretary of Minneapolis-Moline Co., Minneapolis, Minn., manufacturer of gas engines, highway mowers, and industrial tractors. He succeeds W. C. Rich who died last July. Mr. Steinhelber, who has been with the company since 1923, will continue as Controller, in addition to his new duties.

K. N. Cervin, Manager of the Branch Auditing and Systems Departments has been named Assistant Secretary, and W. F. Foss, Manager of the Cost Department, Assistant Controller.

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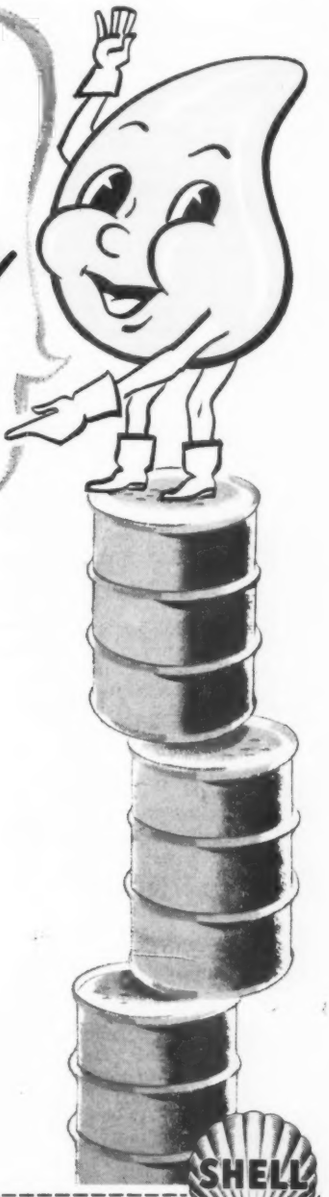

*SHELL RETINAX A GREASE

. . . a superior new multi-purpose grease for all types of heavy-duty automotive vehicles. It does the job of four or more specialized greases—yet only one gun is required.

Recommended for chassis (all points), wheel bearings, universal joints, and water pumps, Shell Retinax A gives you better protection against wear and washing out.

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††Some manufacturers recommend a straight mineral oil for gear lubrication. Your Shell Lubrication Engineer will suggest the proper lubricant in such cases.

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Contractors Team Up On City Expressway

Two Milwaukee Firms Excavate, Backfill for Underpass, Build Three Twin-Box Culverts to Divert Creek

• A PAIR of Milwaukee contractors have teamed up to save more than $100,000 on the first unit of a $100,000,000 expressway system for the city of Milwaukee, Wis. The unit, at a site which is now marshland with a creek running through it, is being built by Speedway Contracting Co. and Druml Co. under a $700,404 contract. The work consists of rerouting the creek; removing 168,000 yards of muck; backfilling with 150,000 yards of sand and gravel; putting in a subbase; driving piling, and constructing a 99-foot-long x 63-foot 4-inch-wide underpass and three twin-box culverts, 250, 246, and 60 feet long respectively.

The underpass and the entire expressway project are designed by Ammann & Whitney, Milwaukee engineering firm for the Expressway Division of the Milwaukee Bureau of Street Construction and Repairs. The job is sponsored by the City of Milwaukee in cooperation with the Wisconsin State Highway Commission of the U. S. Bureau of Public Roads.

Milwaukee's north and south sides are separated by mile-wide Menomonee Valley. At present, the four north-south viaducts which carry most north-south traffic are hopelessly overburdened, creating a serious traffic problem. To help speed traffic through the city, the Expressway Division of the city of Milwaukee had a complete expressway system designed. One leg of this system is a four-lane north-south expressway, through Menomonee Valley.

Excavation for Underpass

The underpass now being constructed lies about halfway between the north and south ends of the valley and must be completed before the rest of the north-south expressway can be built. A creek ran directly through the spot where the future expressway will cross an east-west road to the new Milwaukee County stadium. It was decided to divert the creek, remove the muck, and build an underpass for the stadium road. The contract was signed April 1, but it was June 2 before the shovels could begin excavating. Heavy spring rains and a four-week strike of Milwaukee construction trade workers accounted for the delay. After work was begun, unusually heavy rains kept workers off the job about 15 additional days in the first two months alone. In spite of these obstacles, however, Speedway and Druml still expect to meet the contract time of 310 days. Excavating and backfilling will be finished by about the end of the year.

The Speedway firm is doing the excavating and backfilling, Druml the concrete work, in the first job the two companies have bid together. First, Speedway removed 6,000 yards of material to the south of the work area, forming a diversion channel for the creek. Then they began excavating for the underpass. To remove the 168,000 yards of muck spreading over an area 1,250 feet long x 200 feet wide and extending 25 feet below the existing grade, Speedway brought in two Bay City draglines, one M-65 1¼-yard with a 1½-yard bucket, and one M-45 ¾-yard with a 1-yard bucket. Working a 10-hour shift, they are removing 1,100 to 1,500 pay yards of muck per day. This muck is hauled in ten 10-yard International dump trucks to an abandoned quarry site about ¾-mile away, where it is dumped.

Dewatering Problem

Water in the excavated hole proved a stubborn problem. Standing water was encountered at about 15 feet below the existing grade. Unusually heavy rain aggravated this situation. For example, in July this year Milwaukee had 6.69 inches of rain, compared with a July average for the city of 2.83 inches. The existing culverts could not handle the creek water after a heavy downpour, so in addition to the rain that

A Bay M-65 dragline scoops up muck on the Milwaukee Expressway job and prepares to dump it into a war-surplus International M5H-6 dump truck.

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ACROW SHORES Set in Seconds

ACROWS are truly one-man shores. One man can set an ACROW Shore accurately in a matter of seconds by following three simple steps:

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ACROWS give you 100% salvage—they can be used on all construction jobs with their complete range of four sizes. Use them over and over again—ACROW'S all-steel construction is practically indestructible.

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fell and seeped into the hole, each storm caused the diversion channel to overflow its banks and refill the hole. To alleviate this condition, Speedway set up a 4-inch Jaeger pump to keep the water level down and built a 3-foot dike between the pit and the diversion channel to reduce the overflow. Water in the hole was pumped about 150 feet back into the diversion channel.

Economical Earthmoving

Meanwhile, 12 trucks are bringing in 1,000 yards of sand and gravel backfill per day. This material is hauled about six miles from a pit owned by Speedway. A Caterpillar D8 dozer then pushes the sand and gravel into the excavated areas. Backfilling will be to about two feet above the groundwater level. Above that will be suitable embankment material, preferably clay, to be established when that work is done.

It is in excavating and backfilling that the contractors are saving much of the money that enabled them to underbid all competitors by over $100,000. There were two big savings. First, Speedway owns a gravel pit about six miles away from the job site. As the material at this pit meets Wisconsin State Highway Commission specifications for backfill, it is being used. This effects a saving over the commercial rate for similar fill. Second, in 1946 Speedway had purchased 15 war-surplus International M5H-6 10-yard dump trucks. These trucks, which had long since been written off the books, were still in excellent operating condition, and Speedway owns enough of them to figure the job without having to rent any trucks. When rental fees are low enough, the firm uses its own trucks to remove muck and rents trucks to bring in backfill. When rental fees are high, the firm can then work its own trucks two shifts a day—one to remove muck and one to carry in backfill.

A Caterpillar D8 dozer clears a way for the trucks. Its main job in this project, however, was to push gravel into the pit.

Underpass Structure

The underpass structure will rest on 153 treated-timber pilings, extending to a depth of 35 feet. Edward E. Gillen Co. of Milwaukee is doing this work.

The underpass foundation, concrete reinforced with ½ to ⅞-inch horizontal rods running both ways, will be ready-mixed. The mix will be approximately 1:2:4, but will vary with the aggregate. Only the underpass floor and bridge walls will be built under this contract; the bridge span will be completed later as part of the general expressway contract. Milwaukee Bridge Co. will erect structural steel for the bridge walls. The total bridge structure being built under this contract requires 53½ tons of bar steel, 104½ tons of structural steel, and 1,310 yards of concrete.

Three Culverts

Three rectangular twin-box culverts will divert the creek and dispose of storm water from the stadium area. The first of these—250 feet long, 5 feet 8 inches high, and 14 feet wide—runs east-west and is immediately south of the underpass. The top of this culvert will be 21 feet below the final road grade. It will carry storm water from the stadium area west of the underpass to the creek east of the underpass.

The second is a 246-foot-long twin-box culvert, located about 500 feet south of the underpass. It runs southwest-northeast and will cut the existing creek 13 feet below the future expressway. Outside dimensions of this culvert are 5 feet high x 19 feet 6 inches wide.

A third twin-box culvert, where the creek and storm water meet about 500 feet east of the underpass, will carry the water 9 feet below existing 44th Street. It is 60 feet long, 3 feet 5 inches high, and 21 feet 3 inches wide. All culverts are 1:2:4 ready-mixed concrete, reinforced with ½ to ¾-inch rods. Side walls are 8 feet, roofs and floors, 10 feet.

When this project is completed, early in 1953, the way will be clear for the Expressway Division to build the four-lane expressway across Menomonee Valley.

Personnel

W. J. Buglass is Resident Engineer on the job for the Wisconsin State Highway Commission, which is supervising the construction. Edward Ryan is Resident Engineer and Ben Ratke is General Superintendent for Speedway. John J. Bacik is Superintendent of the Speedway gravel pit. Druml officials in charge of the project are: Edward Goronja and James Yaeger, Job Foremen; Edward DePreter, Engineer; and Oscar Druml, Superintendent.

Fairbanks, Morse Promotions

Orren S. Leslie has been appointed Manager of Manufacturing for Fairbanks, Morse & Co., Chicago, Ill., manufacturer of diesel engines, pumps, etc. In his new post he will be responsible for manufacturing operations in all of the company's various factories, including foreign affiliates. Mr. Leslie will be at the company's headquarters in Chicago.

R. H. Morse III succeeds Mr. Leslie as General Manager of the company's Beloit, Wis., works, the company's largest manufacturing plant, where he will direct all phases of operation. He is the fourth generation of the Morse family to achieve a management position with the company.

R CONSTRUCTION with ACROW

ADJUSTABLE STEEL SHORES

ACROW Steel Shores are engineered and built from base to head for the fastest, safest, securest support on the job. Completely positive simple action leaves no chance for slippage. There is no cutting, wedging, or nailing to eat up time and money. And ACROW Shores have no jacks, levers, or supplementary tools to lose.

EXCLUSIVE ACROW SELF-CLEANING FEATURE makes possible rapid stripping operations. A unique patented extension of the collar nut extends over a segment of the threaded tube (see left). When collar handle is turned in stripping operation, encrusted concrete, dirt, and grit are removed from the thread—making ACROWS instantly ready for use on the next job.

GENERAL SPECIFICATIONS

Shore Sizes, Dimensions, Weights, and Capacities

Size No.	Height		Weight in lbs.	Failing Load		Recommended Safe Working Load	
	Fully Closed	Fully Extended		Fully Closed	Fully Extended	Fully Closed	Fully Extended
1	5 ft. 7 in.	9 ft. 10 in.	46	10.96 tons	8.97 tons	8210 lbs.	6720 lbs.
2	6 ft. 7 in.	10 ft. 10 in.	49	10.50 tons	7.90 tons	7840 lbs.	5975 lbs.
3	8 ft. 2½ in.	12 ft. 5½ in.	56	10.15 tons	7.55 tons	7490 lbs.	5600 lbs.
4	11 ft. 0 in.	15 ft. 0 in.	69	7.27 tons	2.89 tons	5225 lbs.	2050 lbs.

Standard 6" x 6" Beam Type 14" x 4" J Head 14" x 4"*
*J Head available as an insert or standard head.

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Coffing's Model R ratchet-lever hoist.

Ratchet-Lever Hoist

A new coil-chain ratchet-lever hoist is now in production at Coffing Hoist Co., 800 Walter St., Danville, Ill. The Model R features a ratchet and pawl which are said to eliminate the necessity of a friction brake. The load is suspended on the ratchet and pawl at all times, thus it cannot slip, nor will the holding mechanism freeze.

Use of coil instead of roller chain is said to permit the chain to swing or wrap easily in any directon. When not under load, it may be pulled freely through the hoist head for quick adjustment. The new Model R gives added advantages in operation and servicing, according to the manufacturer. The handle operates in any position, it is stated, which solves the problem of working in cramped quarters or where there is little head room. Also, the handle can be operated with either partial or full strokes, depending upon space limitations and desire of the operator. Safety stops prevent spinning of the handle.

The hoist has few parts, and can be completely disassembled with a screwdriver. The unit is available in 1,500 and 3,000-pound capacities. All load-holding parts are said to be designed to withstand a pull equal to several times their rated capacity. In addition, every Model R is factory-tested at 100 per cent overload. The handle will bend under maximum overload conditions, thus giving the operator warning to prevent breakage and dropping the load.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 780.

Automatic Lubricator

Lubricators with one-gallon oil reservoirs and built-in automatic warning switches which signal the operator by horn and red light, or shut off the machine as the oil level becomes too low, have been announced by the Alemite Division, Stewart-Warner Corp., 1826 Diversey Pkwy., Chicago 14, Ill. Oil-Mist units with 12-ounce reservoirs are also now available with built-in warning switches.

These new models further reduce dependence upon the human factor in automatic lubrication, Alemite points out. Previous models, through employment of a solenoid switch, gave lubrication when the machine on which they were used was in operation, but had provision only for visual measurement of oil remaining in the reservoir. The gallon-size reservoir cuts frequency of filling, and the signaling device makes it impossible for the unit to run dry accidentally.

Two models of Oil-Mist units with gallon reservoirs are available. One, Model 4958, is wired with a normally open switch, which makes contact when the level of the oil goes below 23 ounces. The switch sets off an immediate warning by red lights and/or horn. Model 4859, the other model with gallon reservoir, has a closed switch, which breaks contact when the oil level goes below 23 ounces and shuts off the machine.

Two new models of Oil-Mist lubricators with 12-ounce reservoirs having low-level signaling devices are also available. Model 4960 shuts off the machine as the oil level drops, while Model 4961 either sets off a warning horn or flashes a red light when the oil falls to the 2-ounce mark in the reservoir.

Further information may be secured from the company. Or use the Request Card that is bound in at page 18. Circle No. 761.

Catalog on Pipe Fittings

A guide on standard and special fabricated fittings for piping and equipment layouts may be obtained from Naylor Pipe Co., 1230 E. 92 St., Chicago 19, Ill.

The bulletin points out that standard fittings for lightweight pipe are available in carbon steel with 10-gage wall thicknesses. They are also available in 3/16 and 1/4-inch thicknesses. The plain ends can be fitted with slip-on welding flanges; standard-weight ends grooved for couplings; and welding rings or any other type of connection.

Fabricated specials are available in a range from 3 to 44 inches in diameter and in wall thicknesses up to 1/4 inch. Fittings illustrated in the catalog include elbows, tees, reducers, laterals, wyes, crosses, and bends. The catalog lists specifications.

This literature may be obtained from the company by requesting Bulletin No. 525, or by using the Request Card at page 18. Circle No. 756.

Universal Atlas Ups Neel

George S. Neel, former Western Region Sales Manager, has been elected Vice President, Central and Western Region Sales, Chicago, Ill., for the Universal Atlas Cement Co., New York, N. Y. Mr. Neel, who has been with the company since 1919, succeeds A. C. Cronkrite, who retired last August after 15 years in the post of Vice President, Central Region Sales.

Announcing the NEW Commander

ANOTHER Cedarapids PRODUCT

FOR HIGHER PERCENTAGES OF SECONDARY CRUSHING AND GREATER SCREENING CAPACITY

LARGER ROLL CRUSHER

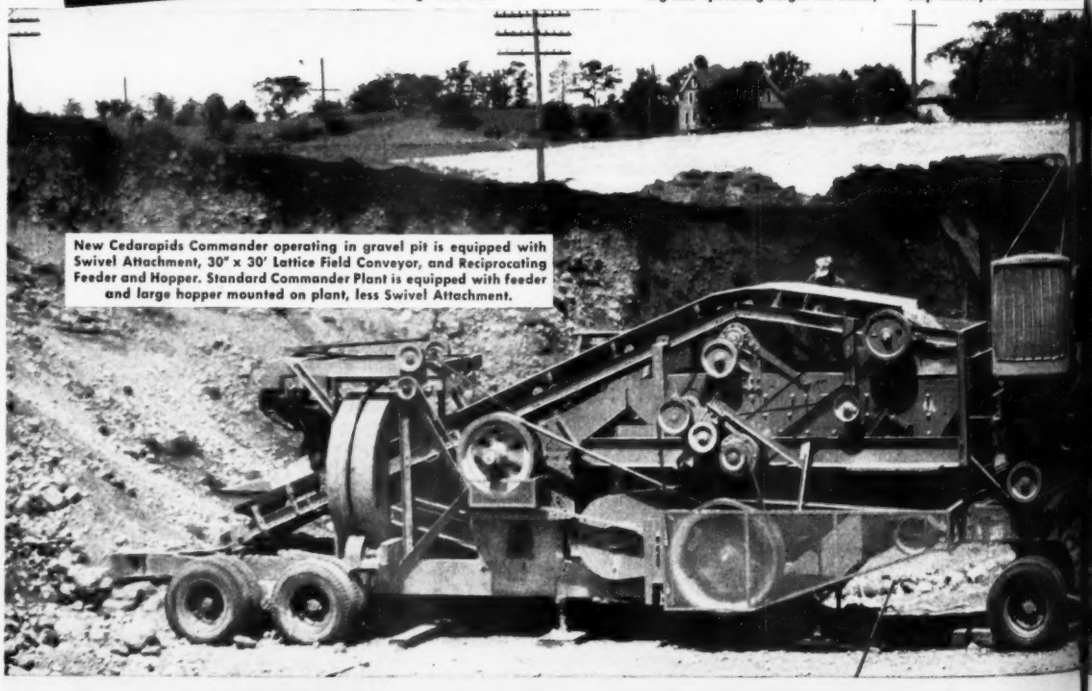
The 30"x22" Roll Crusher in the new Commander increases secondary crushing capacity by approximately 50% for the producer who needs greater output, or whose pit conditions put a bigger load on the secondary crusher. Heavy-duty construction features include: Smooth or corrugated manganese steel roll shells; Timken tapered roller bearings for maximum long wear and economical operation; Finger timing gears of chrome molybdenum and heavy chrome vanadium steel; Helical tension springs; Easy roll shell opening adjustment. Cedarapids patented safety shear plates prevent crusher damage from uncrushable foreign material.

LARGER SCREEN

The big 48" x 10' Screen on the Commander Plant gives you 30% more screening capacity! This, plus the more efficient screening action and the *extra* capacity of all Cedarapids Horizontal Vibrating Screens, assure big volume output of accurately graded aggregate. The top deck feeding principle used on Cedarapids Plants also increases capacity by eliminating any possible choke point. By making an immediate split of the pit material, the circulating load on crushers, belts and screens is reduced and the output of the plant is not limited by the capacity of the jaw crusher. Lower over-all head roomr equired (traveling and operating height the same).

LARGER CONVEYOR

The feed conveyor, delivery co... ors and under-crusher conveyo... the Cedarapids Commander ... been widened to 30" to hand... increased capacity of this ... The channel frame conveyors ... bine light weight with excep... strength. Pulley shafts are ... with sealed anti-friction bea... The idler ball bearings ... sealed for life. These belt co... ors are ideal for Commander ... because they are built for c... uous, efficient service und... toughest working conditions ... optional equipment, an 18" ... sand conveyor and an 18" ... chip conveyor are available.



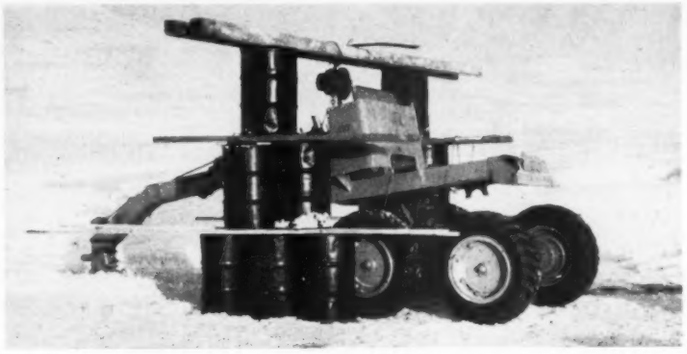
New Cedarapids Commander operating in gravel pit is equipped with Swivel Attachment, 30" x 30' Lattice Field Conveyor, and Reciprocating Feeder and Hopper. Standard Commander Plant is equipped with feeder and large hopper mounted on plant, less Swivel Attachment.

THE IOWA LINE *of Material Handling Equipment Includes:* ROCK AND GRAVEL CRUSHERS • BELT CONVEYORS • STEEL BINS • VIBRATOR AND REVOLVING SCREENS • UNITIZED ROCK AND GRAVEL PLANTS • FEEDERS • PORTABLE POWER CONVEYORS • PORTABLE AND STATIONARY STONE, GRAVEL AND SAND PLANTS • REDUCTION CRUSHERS • BATCH TYPE AND VOLUMETRIC TYPE ASPHALT PLANTS • DRIERS • DUST COLLECTORS HAMMERMILLS • WASHING PLANTS • VIBRATING SOIL COMPACTION UNITS • DOUBLE IMPELLER IMPACT BREAKERS

Arctic Winds Blew— Reassembly Went On

With rudimentary facilities and proper clothing, it is no problem to reassemble heavy machinery in the Arctic. At least, according to Fred Moe, Caterpillar Tractor Co. sales representative, who has done it.

Last April, he and a group headed by J. G. Dyer of the U. S. Weather Bureau visited joint Canadian and United States bases recently built in the Arctic to supply long-range weather forecasts for North America. Heavy equipment is required at these stations to clear snow, prepare and maintain airstrips, haul freight, and construct new facilities. Since an airlift is the only practical method of transporting machinery to these bases (one is less than 400 miles from the North Pole), Caterpillar had not only to winterize its equipment for temperatures as severe as 65 to 70 degees below zero, but also to disassemble it into packages not weighing more than 4,000 pounds each.



A Cat motor grader in the Arctic is reassembled with the aid of a homemade hoist. Here, the main frame components are being placed.

After some 3,000 miles of flying, Moe and his men, in Arctic clothing, began to reassemble this equipment. An air freighter brought the frame of a Cat No. 212 motor grader. Using planks, oil drums, and a block and tackle, Moe and three helpers rigged up a hoist. With this they assembled the frame, engine, and rear mechanism. Despite temperatures of 12 to 15 degrees below zero and 15-mph winds, the grader was assembled in 12 hours. Equipment was set up at other bases in the same way. Later, a different technique was adopted for the remaining equipment. Units were assembled at the main base and flown intact to satellite bases by C-119 transport planes with 7-ton load capacities.

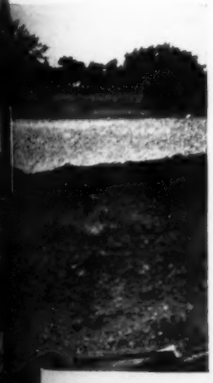
"As a whole", says Moe, "I enjoyed the experience very much, although it did get a little cold around the edges on a couple of occasions."

...PORTABLE CRUSHING AND SCREENING PLANT!

HERE'S a brand new gravel crushing and screening plant designed specifically to meet the demand for *much greater tonnages of fine-crushed products.* The Cedarapids Commander has approximately the same over-all dimensions as the popular Cedarapids Junior Tandem, but it contains a *bigger* Roll Crusher, a *larger* Horizontal Vibrating Screen and *wider* Conveyors to handle the increased capacity. More secondary crushing and greater screening capacity give you a big advantage in any pit, but are especially profitable where there is a high percentage of pit material to be crushed.

The Commander's big-volume output is combined with extreme portability and flexibility to handle a wide range of crushing and screening conditions... *and you get the same low maintenance and operating costs that are standard in the Junior Tandem!* It adds up to a pleasant profit picture in today's booming aggregate market. Find out about *all* the many new Commander features that help you command the market, the bidding, the pit conditions and the profit potential on every job. See your Cedarapids distributor today.

... and a host of other big-production features ...



Swivel Feed Attachment (optional) to drive 30" x 30' lattice frame feed conveyor (as shown in picture).

30" Reciprocating Feeder and Hopper, clutch controlled from operator's platform or ground, assure a steady, workable flow of material. A weight-loaded metering gate regulates the feeding for properly balanced plant operation.

75" x 22" Elevating Wheel Return System makes the Commander shorter and narrower for easier transportation, and speeds handling of material from crushers to screen.

Sand Ejector Screw, 12" diameter and 4' long, is used under the screen for discharging sand onto the sand conveyor. Optional equipment.

The Commander is easily converted into a high capacity rock plant by using a Cedarapids 2236 AAA or 2540 AAAA Portable Primary ahead of it.

Highly portable for easy moving from pit to pit. Fast set-up and take-down minimize lost time between jobs.

It's another reason why so many contractors BUY CEDARAPIDS!

The development of new products to meet the constantly increasing demands for greater production of specification aggregate with no increase in operating and maintenance costs, is still another reason why more and more aggregate producers *Buy Cedarapids.*

Cedarapids equipment is produced in such a wide range of sizes and types, and designed for such a wide variety of work that selection of the proper machine for your specific job is no problem ... and you are sure of getting equipment which is as modern and efficient as constant engineering research and precision methods of manufacture can make it. Iowa fully understands the needs of producers because Iowa Engineers keep in close contact with the problems of the field.

Cedarapids — Built by IOWA

IOWA MANUFACTURING COMPANY

CEDAR RAPIDS, IOWA, U.S.A.

Detroit Society Recommends Rock Salt for Snow Removal

Straight rock salt (not mixed with abrasives) is the most effective and economical means of cleaning ice and snow from streets and highways, according to the Engineering Society of Detroit, a group of 38 major technical societies in the Detroit area.

The Society analyzed various methods of snow removal including abrasives, abrasives treated with chemicals, abrasives treated with rock salt, and straight rock salt, and found that the latter not only does the job, but also enables cities to save as much as 50 per cent of the money spent on snow removal.

Many commissioners who have switched from abrasives to rock salt in recent years, have kept accurate cost data on the amount of money saved. Among them, F. Ray Williams, Superintendent of Highways in Saratoga County, N. Y., found that abrasives cost him $7.59 a mile, whereas coarse rock salt cost $3.32. Since the county has 216 miles of state highway, this produced a saving of $922.32 on every storm.

Among the reasons for the substantial savings when rock salt is used is the fact that abrasives, if they provide a nonskid surface, must be spread again and again during a storm. In addition, when the storm is over, the snow plus the abrasives must be plowed and hauled away. (Lansing, Mich., saves $5,000 a year on this score alone.) Also, one truckload of coarse rock salt will cover 5 to 10 times as much street surface as one truckload of abrasives.

Space-Heater Applications

Contractors concerned with keeping their jobs going this winter despite bad weather will be interested in obtaining a copy of the booklet being distributed by Herman Nelson Division, American Air Filter Co., Inc., Moline, Ill.

This 24-page "Cost Control" is illustrated with applications of portable heaters on actual construction jobs involving space heating of working areas, thawing, drying materials, preheating mechanical equipment, and scores of other heating jobs. These versatile heaters provide up to 450,000 Btu/hr of fresh heated air. Flexible ducts transfer this heat to the spot where it is needed.

This literature may be obtained from the company, or by using the Request Card that is bound in at page 18. Circle No. 775.

New Material Spreader

A surface material spreader mounted on pneumatic tires and pulled or pushed by a truck is made by Gar Wood Industries, Inc., 36253 Michigan Ave., Wayne, Mich. The Model 5 Buckeye can regulate for either uniform or tapered spread from a sprinkle up to 2½ inches deep. Models offering 9, 10, and 12-foot widths can be narrowed in 6-inch multiples. Base-course spreads of stone or slag from 2 to 6 inches deep can be made with a strike-off attachment.

The spreader can be operated in both directions. The direct drive from the spreader wheels to the feed roll controls the flow. Suspended above the feed roll, the solid screw conveyor-type agitator rotates to move the proper amount of material to both ends of the box. It can be stopped at any time by a throw-out lever.

The fluted feed roll in the bottom of the back pocket is driven by roller chain and sprocket through the reversible chain transmission. It provides a uniform spread because of its relation to the speed of the truck. The Model 5 is made of 3/16-inch welded steel plate. A steel-grating platform provides convenient control.

This Model 5 Buckeye spreader features controlled volume and uniform spread. The feed roll can be adjusted to permit a tapered spread of materials.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 798.

Data on Tractor Shovel

Complete details of the new Skid-Shovel for International tractors are presented in a folder just released by Drott Mfg. Corp., 3841 W. Wisconsin Ave., Milwaukee 8, Wis. It announces the 1¼-yard for TD-9, the 2-yard for TD-14A, and the 3-yard for TD-18A.

The folder also describes the new operating and construction features of the Skid-Shovel. The hydrospring which cushions hydraulic shocks, the breakout action which exerts a digging force of 13 tons, and the high lift are all illustrated.

This literature may be obtained from the company, or by using the Request Card at page 18. Circle No. 744.

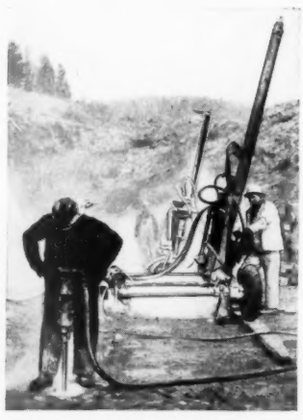
A BIGGER Compressor for your air tools

Here it is . . . biggest and most powerful of all Blue Brute Portable Compressors! This 600' unit *really* costs less to operate, with its *low* fuel consumption and the *minimum* maintenance it calls for.

Just check these Worthington features it incorporates:

Air-operated fuel-saver control that keeps fuel consumption way down (never a pound of unnecessary air pumping, automatic unloading at idling speeds, engine speed in ratio to air requirements) . . . hydraulically controlled clutch for really easy operation . . . identical stack-type, oil-bath air cleaners on engine and compressor for easy servicing . . . two full-length tool boxes with ample capacity . . . two-piece side panels for better temperature control and easy handling by one man . . . unit core radiator and intercooler, offering maximum cooling surface . . . frame protected fuel tank for easy, low level filling . . . three-point engine and compressor mounting . . . formed steel channel frame, semi-elliptical spring mounting and automotive-type steering.

There's even more you'll want to know about this new portable compressor. Write for Bulletin H-850-B74 to Worthington Corporation, Construction Equipment Division, Plainfield, N. J.



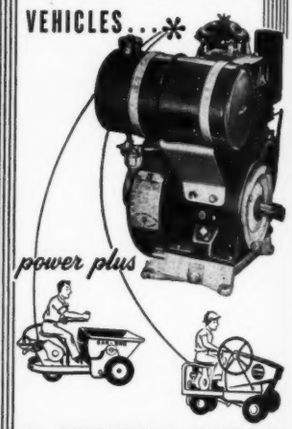
ENOUGH AIR IS LEFT OVER in this hookup with the new Blue Brute 600' and with two 4-inch wagon drills to operate the heavy-duty rock drill in foreground!

H.2.4

If It's A Construction Job, It's A BLUE BRUTE Job

WORTHINGTON
Construction Equipment

GLADDEN ENGINES NOW OPERATING OVER 3000 MATERIAL HANDLING VEHICLES...*



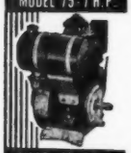
AN OUTSTANDING RECORD OF TROUBLE-FREE PERFORMANCE

"We are using Gladden engines exclusively on our material handling units because of their universally accepted dependability and powerful performance," says the Vice-President of one of the leading manufacturers of material handling units.

MODEL 75-7 H.P.

Strong, reliable and inexpensive to operate, GLADDEN'S series of single cylinder, air-cooled, pretested engines find real usefulness in every construction application.

FEATURES OF DESIGN



MODEL 50-5 H.P.

Timken Main Bearings

Automotive Type Connecting Rod Bearing Inserts (Models 50 & 75)

Meehanite Cylinder Castings

Pressure Cast Aluminum Head

Oil Bath Air Cleaner as Standard Equipment (Models 50 & 75—Optional 40)

MODEL 40 4 H.P.

Generous Fin Area Insures Maximum Cooling

GLADDEN ENGINEERS WILL ADAPT THESE ENGINES TO SPECIAL INSTALLATIONS OR REQUIREMENTS UPON REQUEST...

For further information write

GLADDEN PRODUCTS CORPORATION

NOW IN THE 33rd YEAR OF ENGINE BUILDING

635, Dept. 100, West Colorado Boulevard Glendale 4, California

Let's *all* Register and VOTE

Convention Calendar

October 15-17—SASHO Meeting
Annual Meeting, Southeastern Association of State Highway Officials, Hotel Roosevelt, New Orleans, La. J. A. Kinkead, Registration Chairman, P. O. Box 4245, Baton Rouge 4, La.

October 20-24—National Safety Congress
Fortieth National Safety Congress and Exposition, Conrad Hilton Hotel, Chicago, Ill. R. L. Forney, General Secretary, 425 N. Michigan Ave., Chicago 11, Ill.

October 23-24—Highway and Surveying
Highway and Surveying Conference, University of Florida campus, Gainesville, Fla. Thos. L. Bransford, Associate Professor of Civil Engineering, University of Florida, Gainesville, Fla.

October 26-November 1—Panamerican Meeting
Extraordinary Panamerican Congress of Road Builders, Mexico City, Mexico. Ing. Armando Salinas, Executive President, Organizing Commission, Marconi 2, Desp. 36, Edificio Garantias, Mexico, D. F.

October 27-29—Lubricating Grease Institute
Annual Meeting, National Lubricating Grease Institute, Edgewater Beach Hotel, Chicago, Ill. Harry F. Bennetts, Executive Secretary, 4638 J. C. Nichols Parkway, Kansas City 2, Mo.

November 5-7—Virginia Highway Conference
Sixth Annual Virginia Highway Conference, Virginia Military Institute, Lexington, Va. R. P. Ellison, Executive Assistant, Virginia Department of Highways, 1221 E. Broad St., Richmond 19, Va.

November 7-8—Professional Engineers
Fall Meeting, National Society of Professional Engineers, Jefferson Hotel, Richmond, Va. Paul H. Robbins, Executive Director, 1121 Fifteenth St., N. W., Washington, D. C.

November 13-15—ASCE International Meeting
International Convention, American Society of Civil Engineers, Condado Beach Hotel, Puerto Rico. Don P. Reynolds, Assistant to the Secretary, 33 W. 39th St., New York 18, N. Y.

November 17-21—National Sand & Gravel and National Ready Mixed Concrete Associations
Seventh Annual Short Course of the National Sand & Gravel Association and National Ready Mixed Concrete Association, University of Maryland, College Park, Md. Stanton Walker, Director of Engineering, 1325 E St., N. W., Washington 4, D. C.

December 9—Concrete Producers
Eighth Annual Convention, New York State Bituminous Concrete Producers Association, Hotel Statler, Buffalo, N. Y. Gus Rayner, Executive Secretary, Box 667, Albany, N. Y.

December 10-12—AASHO Convention
Annual Convention, American Association of State Highway Officials, Municipal Auditorium, Kansas City, Mo. Rex M. Whitton, Missouri State Highway Commission, Jefferson City, Mo.

January 7-9, 1953—Weed Control
Northeastern Weed Control Conference, Hotel New Yorker, New York, N. Y. Dr. Walter C. Jacob, Secretary-Treasurer, Vegetable Corps Dept., Cornell University, Ithaca, N. Y. (for information). Hotel New Yorker (for reservations).

January 13-15—National Constructors
Annual Meeting, National Constructors Association, Hotel Commodore, New York, N. Y. J. O'Donnell, President, 50 E. 41st St., New York, N. Y.

January 13-16—Highway Research Board
Annual Meeting of the Highway Research Board, National Academy of Sciences, Washington, D. C. Fred Burggraf, Director, 2101 Constitution Ave., Washington 25, D. C.

January 14-16—Photogrammetry Convention
Annual Convention, American Society of Photogrammetry, Shoreham Hotel, Washington, D. C. Louis J. Reed, Meetings Chairman, 201 Wellington Road, Alexandria, Va.

January 26-27—Landscape Architects
Fifty-fourth Annual Meeting, American Society of Landscape Architects, Atlanta Biltmore Hotel, Atlanta, Ga. Bradford Williams, Corresponding Secretary, 9 Park St., Boston 8, Mass.

January 26-28—Asphalt Paving
Annual Convention, Association of Asphalt Paving Technologists, Rice Hotel, Houston, Texas. Ward K. Parr, Secretary-Treasurer, Box 376, Ann Arbor, Mich.

January 26-29—Society of Heating and Ventilating Engineers
Fifty-ninth Annual Meeting of the American Society of Heating and Ventilating Engineers, Conrad Hilton Hotel, Chicago, Ill. A. V. Hutchinson, Executive Secretary, 62 Worth St., New York, N. Y.

February 1-5—AED Convention
Thirty-Fourth Annual Convention, Associated Equipment Distributors, Conrad Hilton Hotel, Chicago Ill. P. D. Hermann, Executive Secretary, 30 E. Cedar St., Chicago 11, Ill.

February 9-11—ARBA Meeting
Annual Convention, American Road Builders' Association, Statler Hotel, Boston, Mass. Lt. Gen. Eugene Reybold, Executive Vice President, International Bldg., Washington 4, D. C.

February 23-26—National Sand & Gravel and National Ready Mixed Concrete Association
Annual Conventions, National Sand & Gravel and National Ready Mixed Concrete Associations, Fairmont Hotel, San Francisco, Calif. V. P. Ahearn, Executive Secretary, 1325 E St., N. W., Washington 4, D. C.

March 2-6—ASTM Meeting
Spring Meeting and Committee Week, American Society for Testing Materials, Hotel Statler, Detroit, Mich. Executive Secretary, 1916 Race St., Philadelphia 3, Pa.

March 16-20—Corrosion Engineers
Ninth Convention, National Association of Corrosion Engineers, Sherman Hotel, Chicago, Ill. A. B. Campbell, Executive Secretary, 1061 M & M Bldg., Houston 2, Texas.

U. S. Construction Committee

A 1952-53 Construction and Civic Development Committee of 34 men has been appointed by the U. S. Chamber of Commerce. It includes five Chamber directors and representatives of all segments of the building industry from every section of the nation.

During the ensuing year, the committee will consider such subjects as major factors affecting construction markets (privately and publicly financed), Government control of materials, credit and rents, and the planning of private and public construction projects. It will also concentrate on a program for more and better apprentice training in the building trades, more intensive research in the construction field, and modernized city planning, zoning, and building codes.

Norman P. Mason, Treasurer of Wm. P. Proctor Co., North Chelmsford, Mass., heads the group.

"It's designed to leap over obstacles!"

ANOTHER OUTSTANDING COBI PILE PROJEC

Daniel O'Connell's Sons, Inc. Are Using Cobi Piles in the Abutments of the Connecticut River Bridge in the City of Chicopee and Town of West Springfield

Eastern Concrete Pile Co. Inc. are driving all the cast-in-place piles for the abutments of the Connecticut River Bridge in the City of Chicopee and Town of W. Springfield, now under construction for the Massachusetts Department of Public Works by Daniel O'Connell's Sons, Inc. of Holyoke, Mass.

The photo at left shows two rigs driving the 507 Cobi piles, averaging 30 to 35 feet long, in the West Springfield abutment. Although these are 50-ton piles, under a load of 100 tons, the test piles settled only 1/16 of an inch. Once again we point with pride at an exceptional test of the Cobi pile.

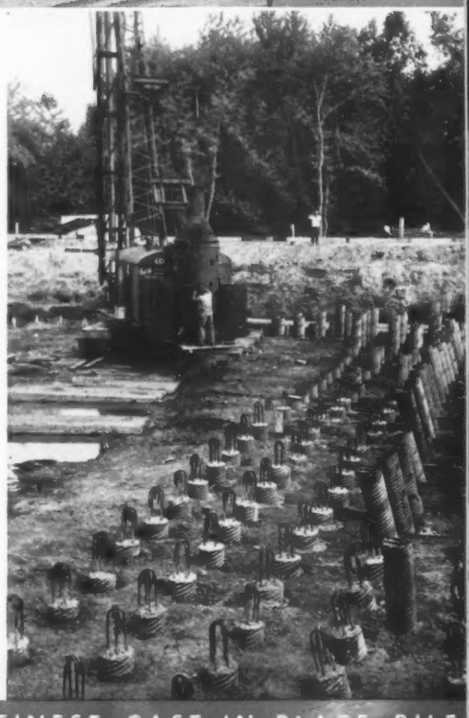
For the Chicopee abutment Eastern Concrete Pile Co. Inc. will drive 471 piles, 90 to 100 feet in length.

HERE ARE SEVEN REASONS WHY YOU SHOULD SPECIFY AND USE COBI PILES

1. COBI PILES drive straighter, due to the constant cross section of the heavy mandrel.
2. COBI PILES are more economical, they are driven in intimate contact with the soil and screw themselves into the ground.
3. COBI PILES are cast in forms that are watertight. Every seam and splice is continuously welded.
4. COBI PILES maintain the original shape and form of the shells. They are driven as an integral part of the mandrel.
5. COBI PILES are largest where the need is greatest, down below.
6. COBI PILES show less settlement under heavy loads.
7. COBI PILES are anchored in the ground, they resist uplift best.

Cobi Piles are Driven Under License By
PNEUMATIC PILE CO. OF NEW YORK

For More Details Contact
EASTERN CONCRETE PILE CO. INC.
80 BOYLSTON STREET BOSTON, MASS.
LIBERTY 2-5310



THE COBI PILE IS THE WORLD'S FINEST CAST-IN-PLACE PILE

Traffic Nightmare Has Become a Dream

Four Crosslanes and an Electronic Traffic-Control Net Uncork New Jersey's Worst Bottleneck

• A LOT of truck drivers and motorists are probably sleeping better these nights. They can thank the New Jersey State Highway Department, which redesigned the Tonnele Avenue Traffic Circle—once New Jersey's worst bottleneck—and New Jersey Asphalt & Paving Co., which was able to effect the change in 30 working days.

Anyone who ever used this circle, especially during the rush hours and on summer weekends and holidays, knows what a nightmare it was. No less than 28 traffic lanes fed in, out, over, and around it. Traffic volumes ran as high as 113,000 vehicles per day, with peaks of about 8,000 per hour. As many as six traffic patrolmen were sometimes required to filter the myriad trucks, busses, and cars into proper channels.

Four new lanes across the circle and 33 electronically controlled traffic lights have changed all this. Vehicles now feed into the intersection in fire-drill fashion; following directional signals and new neon signs, they move quickly and easily through this focal point of metropolitan-area traffic.

The Previous Pattern

Located less than a mile from Journal Square in Jersey City, the Tonnele Avenue Circle carries a great deal of the traffic entering and leaving the commercial district of that city. To the west and north of it is most of North Jersey's diversified industry. It therefore carries quantities of truck loads to redistribution points. Prior to the construction of the Lincoln Tunnel, it was the main access point for all traffic feeding into New York City through the Holland Tunnel, and for most New York traffic going west or south. On weekends and holidays it carried vacationers to the Jersey shore and lakes.

The intersection is a two-level affair: the circle itself at grade, and an elevated expressway with connecting ramps passing over it. Seven different roadways enter or leave the circle.

The traffic-circle pavement averaged 40 feet in width, but because of the recurring entrance and exit lanes it could never carry more than two lanes of traffic. The circle provided an adequate means of vehicle diversion for moderate traffic, when vehicles could "slip" from one lane to another; but as traffic approached a peak this became impossible, especially for the giant semitrailers. The only way to prevent the area from becoming a collecting point for accidents was to have a police officer at each intersection to wave on a few cars and trucks at a time from each lane. Even so, with five two-lane arteries entering the circle, the two-lane flow around the periphery was a bottleneck of the worst kind. The "backwash" sometimes extended for miles.

New Flow Pattern

Careful study of the flows provided a solution. First, get some of the surface-level traffic directly across the circle, in effect reducing the number of lanes feeding *around* the circle. And second, use electronic policemen to direct and control the traffic. The entry of Routes 1 and 10 onto the circle was the point of acute congestion. By widening this point to provide four lanes of entry, instead of two, and allowing all of this traffic to feed directly across the circle, most of the surface load was removed from the outer ring. Two of these crosslanes feed into the Holland Tunnel access and two lead to north Tonnele Avenue.

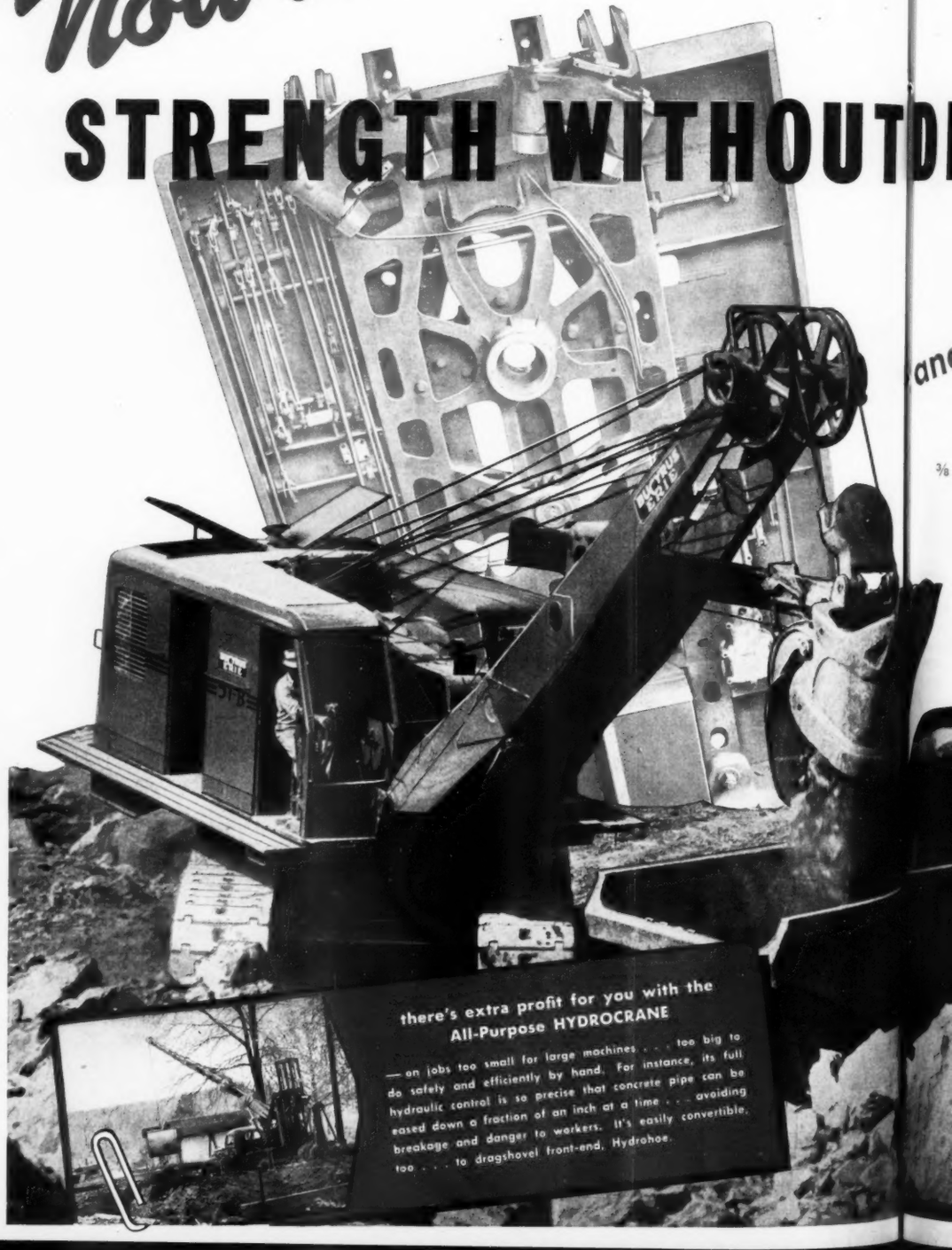
Other work included widening portions of the circle itself, and changing the shapes of some of the islands between opposing and intersecting lanes.

A separate contract provided for the installation of a complete traffic-control system. Thirty-three traffic lights, mounted at 17 positions and operated by an electronically controlled net, now direct the new traffic flows. Five new

On the Jersey City Tonnele Avenue traffic-circle job, two Worthington pneumatic tampers powered by a 210-cfm I-R Mobil-Air compressor (right background) consolidate backfill around a replaced Dresser coupling on a water main.

Now . . .

STRENGTH WITHOUT



there's extra profit for you with the All-Purpose HYDROCRANE

— on jobs too small for large machines . . . too big to do safely and efficiently by hand. For instance, its full hydraulic control is so precise that concrete pipe can be eased down a fraction of an inch at a time . . . avoiding breakage and danger to workers. It's easily convertible, too . . . to dragshovel front-end, Hydrohoe.

A Kwik-Mix 16-S mixer batches up special Atlas white concrete for the curbing.

An over-all view of the project as seen from the Pulaski Skyway, looking east.

neon-tube signs plus additional standard black-and-white directional signs indicate the proper means of crossing the area. The motorists' nightmare has thus become a traffic engineer's dream.

The Construction

Of course all of this did not become effective with the planning; it had to be constructed—and with a minimum of interference to existing traffic flows. New Jersey Asphalt & Paving Co., Jersey City, N. J., held the $158,000 contract for grading, paving, and curb work. Lighting Electric Service Co., Newark, N. J., handled the electrical installations, which cost about $50,000. Both outfits, using day and night shifts, completed the jobs within the 30 working days specified in the contract. Construction which interfered with traffic had to be suspended during the rush hours—7 to 9 a. m. and 4 to 7 p. m. Work started March 17 and was 100 per cent completed by May 28.

Each of the new lanes is 12 feet wide. A ¾-yard Thew-Lorain shovel and an International TD-14 tractor-dozer teamed up and excavated the new lanes across the circle to a depth 12 inches below the proposed pavement grade. The excavated material was loaded into 16-yard trucks and taken away for spoil. In its place the contractors put 12 inches of Type 1 selected soil as the subgrade. A Caterpillar No. 12 handled the leveling off while a 10-ton Hercules 3-wheel roller compacted the material to 95 per cent Proctor.

In one area the contractor ran into a small rock outcropping. Four Chicago Pneumatic drills, powered by a 600-cfm I-R Gyro-Flo compressor, opened up 1¾-inch holes. Powder monkeys shoved in Du Pont 60 per cent sticks, covered the area with wire mats, and blasted 'er out. A Lima 34 with a ¾-yard Owen clam loaded the rock into trucks for spoil.

In places where the new lanes crossed over existing water mains, the contractor excavated around the pipe and installed new Dresser couplings. Backfill was compacted with two Worthington pneumatic tampers powered by a 210-cfm I-R Mobil-Air compressor.

The new lanes are paved with 10 inches of reinforced concrete. The reinforcing is 2 inches below the surface and consists of ⅜-inch bars, 7½ inches on centers longitudinally and 23 to 27 inches on centers transversely. The spex called for prefabricated expansion and contraction joints The joints are made up of 18-inch-long 1¼-inch bars in stainless steel or Monel metal tubes 10 inches long, 12 inches on centers. The contractor used tongue-and-groove "cut to fit" construction joists at all odd-shaped sections.

The concrete was a 1:1.42:3.36 nominal mix. Spex called for the addition of ¾ ounce of Darex air-entraining agent and 2 pounds of calcium chloride for each bag of cement. Darex improved the workability of the mix while the chloride assured the high strength necessary for early use of the pavement.

Because of the large number of odd-shaped areas to be paved, the contractor placed and finished the concrete by hand. Hudson Builders, Jersey City, N. J., supplied the concrete in transit-mix trucks, chuting it directly on the subgrade. A portable gasoline-powered vibrator served to settle it in place. A wood strikeoff screed, run on top of the 10-inch Blaw-Knox forms, leveled the concrete. This was followed by hand finishing with a bull-float and burlap drag. Curcrete was sprayed on with a small hand sprayer, and the new

(Concluded on next page)

TDEADWEIGHT . . .

counts more than ever

and it's yours with Bucyrus-Erie's 2-yd. 51-B

⅜ to 4-yd. Gasoline, Diesel, Electric Excavators

HERE'S an excavator that combines built-in durability with weight economy to give bigger output with less maintenance.

For instance, the 51-B's revolving frame is a single box-section casting of annealed steel . . . specially developed and cast by Bucyrus-Erie. This solid "backbone" provides real rigidity for machinery alignment — yet holds weight to a minimum. As a result, vibration is minimized in the 51-B . . . and it can swing fast, work at a profit-building pace.

The 51-B's truck frame and caterpillar side frames are single annealed steel castings, too — for strength with light weight. Boom and handle are light, welded box-sections that provide ample strength for all working stresses. Independent rope crowd eliminates the need for heavy boom machinery.

Every part of the 51-B reflects advanced engineering that cuts out dead weight without compromising strength. This means you get most economical application of power and lowest upkeep — with bigger payloads every pass, more passes every day. 66E52C

BUCYRUS ERIE

SOUTH MILWAUKEE, WISCONSIN

Most Compared Most Preferred

Traffic Nightmare Has Become a Dream

(Continued from preceding page)

sections were opened to traffic in 3 days.

Placement of new curbing was subbed to Frapaul Construction Co., Hackensack, N. J. Curbs are 9 inches wide at the base, 6 inches at the top, and 20 inches high. The 8-inch battered face was ridged by a special mold on the form to add to the reflectiveness of the surface.

Personnel

The contractor's forces were under the direction of Leonard Bellezza, Project Manager, and John Vasile, Superintendent. New Jersey Asphalt & Paving Co. employed 30 to 40 men working two shifts—8 a. m. to 4 p. m. and 4 p. m. to 12 p. m.

The New Jersey State Highway Department was represented on the job by Oscar Vogel, Principal Engineer, with Harry D. Robbins, Supervising Construction Engineer, and R. M. Beck, Northern District Construction Engineer. The traffic design was developed by W. R. Bellis of the Bureau of Planning and Traffic. R. J. Abbott is State Highway Commissioner, and E. W. Kilpatrick, State Highway Engineer.

Traffic control was under the jurisdiction of the Jersey City Police Department.

Rigid Plastic Pipe Laid at Campus Lab

The Engineering Department of the Ohio State University recently installed a 1,500-foot line of 4-inch rigid plastic pipe from a new campus laboratory to a sewage-treatment plant.

The purpose of this sewage-treatment plant is to give graduate engineers a training in sanitation methods. The new lab also serves the Ohio Department of Natural Resources. The plastic line returns raw sewage from the treatment plant to a manhole which empties into the city main.

In one day two men installed a 1,500-foot plastic supply line to a new sewage-treatment plant at Ohio State University. The pipe and fittings were manufactured by Yardley Plastics Co. and the contractor was Brock-Sanders Construction Co.—both of Columbus, Ohio.

Both the clay supply line and the plastic return line were laid in a trench 3 feet wide x 6 feet deep. The plastic line was run about a foot above the clay pipe. Engineers expressed confidence that the new plastic pipeline would withstand the weight of some 5 feet of backfill, corrosion from soil, and corrosion from chemical properties of sewage. Furthermore, the construction crew laid the 1,500-foot plastic line in one day. There were only two slight bends in the trench, and the 20-foot lengths of plastic pipe were jointed simply by the use of a plastic adhesive and straight plastic couplings.

Yardley Plastics Co., Columbus, Ohio, manufactured all plastic pipe and fittings. Brock-Sanders Construction Co., also of Columbus, was the contractor on the project.

Rebuilding Method For Tractor Rollers

A new method for rebuilding tractor and shovel rollers, idlers, and rails has been developed by The Mir-O-Col Alloy Co., Inc., 340 N. Avenue 21, Los Angeles 31, Calif. The Mir-O-Col 45-90 method combines the impact resistance of Mir-O-Col No. 45 wire with the abrasion resistance of No. 90 wire. It is said to cut rebuilding costs to a fraction of new-part replacement costs.

The No. 45 automatic wire has a high nickel content to withstand heavy impact and can be used in multiple-pass operations without spalling, the company says. Hardness of deposit is from 22 to 28 Rockwell C. The No. 90 automatic wire contains chromium, molybdenum, and vanadium, and has a Rockwell C-scale hardness of 46 to 48. Both wires are readily adaptable to the submerged-arc process of welding.

The company also announces new automatic welding heads and positioners for the Mir-O-Col 45-90 method.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 755.

Hyatt General Sales Mgr.

John R. Gilmartin has been named General Sales Manager of the Hyatt Bearings Division, General Motors Corp., Harrison, N. J. He succeeds Howard K. Porter who has been appointed Assistant to the General Manager on special assignments. Mr. Gilmartin, with the Division since 1929, was formerly Asisistant to the General Sales Manager.

"... the 99-H is the most versatile grader I have ever seen, as well as the most maneuverable."

Howard Price, President
Howard Price and Company
Huntington, W. Va.

"This grader is on U.S. Route 35, where we are engaged in a project involving 2.05 miles of grading, draining and ditching, as well as paving the highway in North Charleston between Two Mile Creek and Tyler Creek.

"This is the first Austin-Western grader to be used in this family of contractors, and I have no hesitancy in saying that the 99-H is the most versatile grader I have ever seen, as well as the most maneuverable. It will do jobs that other graders will not do, and, when the going is really tough, it will operate under conditions that other graders would not attempt. Just recently, after several days of heavy rain, the 99-H was doing its chores on schedule. Two other graders of well-known makes were compelled to stand by until the terrain was favorable to the extent that they could be put to work. This adds up to more hours operation every week for the 99-H.

"Aside from the standpoint of the 99-H's ability to take tough going in stride, it is also the easiest grader to operate that I have ever owned. The operators like it, which means we get more efficiency from them."

HOWARD PRICE AND COMPANY
Howard Price
President

Thank you, Mr. Price, for putting into words—what so many other contractors have learned—that Austin-Western's *exclusive* combination of ALL-WHEEL DRIVE and ALL-WHEEL STEER means top grade performance by America's top grader.

AUSTIN-WESTERN COMPANY · Subsidiary of Baldwin-Lima-Hamilton Corporation · AURORA, ILLINOIS, U.S.A.

Austin BLH Western

SINCE 1859—BUILDERS OF CONSTRUCTION EQUIPMENT

DRILLING CONTRACTORS

Diamond and Shot Core Borings
Dry Sample Borings
Grout Holes and Pressure Grouting
Foundation Testing for Bridges, Dams and all Heavy Structures

also

Manufacturers of Diamond and Shot Core Drills, Accessories & Equipment

SPRAGUE & HENWOOD, INC.

Dept. C, Scranton 2, Pa.

Home away from home for the busy construction man. The little woman is whipping up a snack in the U-shaped kitchen of a Trotwood Trailer.

Trailer Offers Home For Construction Man

A new trailer coach said to provide a comfortable mobile home for construction workers is announced by Trotwood Trailers, Inc., Trotwood, Ohio. The 31-foot coach is available in two styles: one will sleep four persons and the other six. The length of both models is the same. In order to provide the extra bedroom of the six-sleeper, space was gained by slightly shortening the living room, dispensing with the bathtub in the bathroom, and replacing it with a shower.

A large table in the living room provides an ideal work surface where blueprints and plans may be studied. When not in use, the sections of the table top are stored in a nearby closet. The 12-foot living room is completely furnished with a long sofa, modern chairs, plastic cone-shaped lights, venetian blinds, drapes, inlaid linoleum floor, and a large wall mirror that gives the effect of additional space.

Behind the living room is a compact, U-shaped kitchen with an apartment-size gas range, double-bowl sink, work surfaces covered with Formica, and many overhead cupboards. Opposite the sink is a 6-cubic-foot refrigerator between two large closets, one a wardrobe closet and the other for brooms. There are also two wardrobes accessible from the bedroom. The electric water heater is concealed beneath the sink.

Behind the kitchen in the four-sleeper model is the bathroom. In the six-sleeper, the middle bedroom is next to the kitchen. Both models have complete sanitary facilities.

Further information may be secured from the company. Or use the Request Card bound in at page 18. Circle No. 783.

State's Highway Markers Get 6-Month Splash Tests

The first splash tests on highway markers ever undertaken by a state highway department have been completed in Missouri. Conducted in all ten divisions of the state for the first six months of this year, these tests show that signs should be further from the pavement and higher than they are now in order to receive minimum mud splashing from highways. Signs that are 8 feet out from the pavement and 4 feet above the ground will be out of range of 90 per cent of the scum flung by passing vehicles.

The splash tests originated in the complaints of road employees who felt the time needed to clean signs delayed other necessary work. They were begun in January by setting up test panels consisting of black-and-white striped boards, 10 inches wide and 5 feet long. These panels were installed 7 feet above the highway shoulder and at right angles with the pavement. Each set consisted of four such boards, the nearest one being 4 feet from the edge of the pavement and the other three spaced at 18 inches. Maintenance crews kept careful checks on the panels and submitted the results to the traffic engineers.

Missouri plans to move all its highway signs and markers as a result of this test. In moving the signs, not only will the state safety be increased with more visible markers, but also the annual cost of washing the signs after bad weather will be greatly reduced.

Reflectorizing Markers

A new 4-page folder on a method of reflectorizing highway markers is available to personnel of sign shops in highway and street departments. The bulletin illustrates and describes the Cataphote beaded sign kit used to reflectorize hand-lettered, silk-screened, or lithographed signs.

The kit consists of clear plastic-bead adhesive, plus high-grade reflecting beads. The adhesive focuses the beads at the best point for maximum reflectance. It is applied by spray or brush. After it becomes tacky, beads are sprinkled liberally over the face to a depth of about ¼ to ½ inch.

This literature may be obtained from the Cataphote Corp., 958 Wall St., Toledo, Ohio, or by using the Request Card that is bound in at page 18. Circle No. 742.

Borg-Warner Acquires Atkins

Borg-Warner Corp., Chicago, Ill., automotive-parts manufacturer, has acquired E. C. Atkins & Co., Indianapolis, Ind., manufacturer of power saws. The company will be operated as the Atkins Division of Borg-Warner. A branch factory in Portland, Oreg., will also operate as a unit of the Division.

BATTERY-OPERATED
G and T GREASEMASTER

- Attaches to any vehicle.
- 25 foot of high-pressure hose.
- Automatic switch controls any pressure setting up to 3,000 p.s.i.

★Weighs less than 40 lbs. Can be carried anywhere.

Check your distributors now for information on the Greasemaster.

G & T INDUSTRIES • 1440 BARWISE • WICHITA 2, KANSAS

WIRE ROPE

This is the most economical rope we've ever made for excavating and construction

ROEBLING is the best known name in wire rope. That's partly because we were the first wire rope maker in America. But more than that, we've always led in developing better wire and better rope for every purpose.

Today's Roebling Preformed "Blue Center" Steel Wire Rope is the best choice for efficiency and long life on excavating and construction equipment. This rope has *extra* resistance to crushing and abrasion . . . stands up under rough going. It saves you time and cuts costs.

There's a Roebling wire rope for top service on any job. Call on your Roebling Field Man for his recommendations. John A. Roebling's Sons Company, Trenton 2, New Jersey.

ROEBLING

ATLANTA, 934 AVON AVE • BOSTON, 51 SLEEPER ST • CHICAGO, 5525 W. ROOSEVELT RD • CINCINNATI, 3253 FREDONIA AVE • CLEVELAND, 701 ST. CLAIR AVE, N. E. • DENVER, 4801 JACKSON ST • DETROIT, 915 FISHER BLDG • HOUSTON, 6216 NAVIGATION BLVD • LOS ANGELES, 5340 HARBOR ST • NEW YORK, 19 RECTOR ST • ODESSA, TEXAS, 1920 E. 2ND ST • PHILADELPHIA, 230 VINE ST • SAN FRANCISCO, 1740 17TH ST • SEATTLE, 900 1ST AVE S. • TULSA, 321 N. CHEYENNE ST • EXPORT SALES OFFICE, TRENTON 2, N. J.

Nonfluid Lubricant For Pneumatic Tools

A nonfluid oil for lubricating pneumatic tools and equipment is produced by New York & New Jersey Lubricant Co., 292 Madison Ave., New York 17, N. Y. The NR grades absorb rust-causing moisture and form a stable and permanent emulsion.

The company points out that the high film strength of the basic oil has been fortified to provide extra lubricating valve even after the emulsion. Tool efficiency is said to be maintained because blades are kept free from gumming or sticking.

The heavier grades of NR are generally used for warm-weather operation of heavy-duty drills, pile drivers, etc. Other grades are available for use in gear-cases, governors, and bearings. The lubricant comes in a number of units from 1-pound cans to 400-pound drums.

Further information may be secured from the company. Or use the Request Card that is bound in at page 18. Circle No. 741.

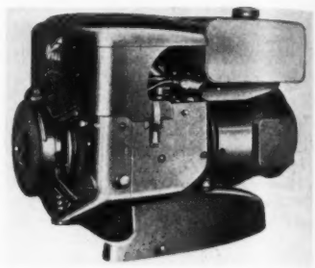
Free Help With Rubber Roads

The laboratory and highway engineering staff of the Natural Rubber Bureau, Washington, D. C., have been greatly expanded this year to handle the increasing rubber-road work-load. The Bureau tries to make available one of its highway engineers as a consultant on every major job using natural-rubber powder. Last year, according to H. K. Fisher, Rubber Road Consultant to the Bureau, there wasn't enough rubber powder or engineering man-hours to keep up with the demand for sections of rubber road.

The Bureau's engineering and laboratory services are available free of charge to qualified municipal and highway authorities through any of the distributors supplying natural-rubber powder for road use, or directly through the Natural Rubber Bureau, 1631 K St., N. W., Washington 6, D. C.

New Electric Plants For Magnet Service

New electric generating plants for magnet service have been developed by D. W. Onan & Sons, Inc., University Ave., Minneapolis 14, Minn. The 3,000 and 5,000-watt dc plants, designed for both stationary and portable service, come in either manual or remote (electric)-starting models.



An Onan CK 2-cylinder air-cooled 4-cycle engine provides prime power for the electric plants. Large bearings, pressure lubrication, and high-tension magneto ignition are built into the engine. All magnet-service units have a sheet-steel hood which affords weather protection to the engine.

The magnet-service generators, directly connected to the engine, have 230 to 250-volt output with rheostat control, commutating poles, junction box, and high-potential tested insulation. They are of drip-proof design and are cooled by a centrifugal blower.

All manual-starting models are equipped with a ratchet-type Readi-Pull starter with the stop button built into the blower housing. Remote-starting models have a built-on starter generator for electric cranking.

Approximate weight of the manual stationary model is 325 pounds; remote stationary model, 345 pounds; and manual portable model, 305 pounds.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 771.

Wolf Creek Gets Last Unit

The last 45,000-kw generator has been placed on the Wolf Creek Project near Jamestown, Ky. (see C. & E. M. Feb., 1948, pg. 2). This brings the estimated average annual output of the power plant to 867,000,000 kwh.

During the first six months of this year, the plant produced 625,000,000 kwh of electrical energy operating at only partial capacity. This is equal to approximately 59 per cent of power consumed in the Nashville Electric Service area during the last fiscal year.

The Wolf Creek Reservoir has a storage capacity of over 6,000,000 acre-feet, approximately one-third of which is reserved for power production. The power is being channeled into the TVA distribution system.

The plant is the third-largest hydro-electric installation in the eastern United States, its capacity being exceeded only by the Wilson Dam Project on the Tennessee River and the Clark Hill Project on the Savannah River.

Olin Forms Ninth Division

Olin Industries, Inc., East Alton, Ill., has established a ninth operating division. Ramset Division will be responsible for the development, production, and sale of powder-actuated tools, fastening studs, and accessories. It will operate the following Olin subsidiaries: Ramset Fasteners, Inc.; The Stemco Corp.; and Portable Industries, Inc.—all located at 12117 Berea Road, Cleveland, Ohio.

J. E. Williams, General Manager of the new division, is a former President and founder of these three companies which became subsidiaries of Olin last spring. He has been associated with power-actuated tools since 1941.

Just south of California's Half Moon Bay, Contractors Snodgroth, Archibald & Ebright of Redwood City tackled a tough highway realignment job. 165,000 cu. yds. of wet, sandy clay had to be moved to take four sharp turns out of the two-lane road. Five "Caterpillar" DW10 Tractors with No. 10 Scrapers took over. They got 3,200 yards out every 9-hr. day, moving that tough material 750 feet. D7 and D8 Tractors and No. 12 Motor Graders were also on the job.

Superintendent Don Westbrook reports: "We're keeping on schedule with our 'Caterpillar' equipment. The DW10s' speed sure helped on this job, with our 1,750,000 station yards of overhaul, 500 feet of free-haul. They fit the job very well."

The DW10 Tractor is all-"Caterpillar" built, with a smooth constant mesh transmission and heavy-duty clutch that's built to last. Its hydraulic power steering never loses the feel of the road. Turning radius is extremely short, only 37 feet nonstop. And synchronized braking holds the trail unit first, prevents jackknifing. The No. 10 Scraper's cable operation allows easy pumping of dead materials, positive ejection moves the stickiest load out in a hurry, and the big open bowl is an easy target for the shovel operators.

Your nearby "Caterpillar" Dealer can give you the whole story on this big, speedy yellow team.

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DIESEL ENGINES
TRACTORS • MOTOR GRADERS
EARTHMOVING EQUIPMENT

New Center-Spread Self-Unloading Truck

A new type of center-spread self-unloading truck body is offered by Baughman Mfg. Co., Shipley Road, Jerseyville, Ill. The special feature of the Spread-Mobile is the distributor plate at the left center of the chassis beneath the forward end of the body, instead of at the rear. This spreads the skid-proofing material ahead of the rear wheels and well under the front wheels, to give better traction for the truck and eliminate backing up slippery hills.

The distributor plate is also lower to give an improved road-hugging spread pattern. Because it is at the left side of the chassis, it concentrates the greatest spread to the left of the truck. Thus the truck, running in a right-hand lane, can effectively cover the other lane or lanes without wasting material on the right-hand shoulder or sidewalk. Any area from 10 to 40 feet wide may be covered as desired.

Another feature of the unit is its self-heating system which keeps the conveying and spreading mechanism, as well as the contents of the lower part of the body, from freezing. This arrangement channels the exhaust through an enclosure which runs under the entire length of the body and surrounds the lower portion of the conveyor. If the material is warm when loaded, this exhaust heater will keep it free-flowing throughout the trip. The lower it settles in the body, the warmer it becomes. By the time it reaches the conveyor and is carried to the spreader, the material penetrates ice easily for more efficient skid-proofing. In addition, the heater prevents the mechanism from becoming brittle in the cold, thus eliminating a common source of breakage. Since the exhaust is a waste product, there is no cost whatever in the operation of the heater, and there is no back-pressure because the rear of the heating enclosure is open.

The driver can control all operations, including the conveyor, spreader, and deflecting baffle, without leaving the wheel—an important safety and time-saving feature. The safety baffle can be lowered at the touch of a handy lever inside the cab, whenever needed to deflect material from the wheels of passing cars or legs of pedestrians. The unit's body and its supports are completely sheathed in smooth rounded sheet steel, free from square corners and ledges. This design, plus the chain and flight conveyor running from the rear to the front of the body, makes it completely self-unloading.

The spreader is said to handle any type of highway maintenance material, including sand, cinders, salt, chips, calcium chloride, gravel, etc. for skid-proofing and similar purposes. Bodies are single welded units of 13-gage high-tensile alloy steel, said to be 30 per cent lighter, 17 per cent stronger, and five times more rust-resistant than ordinary bodies. Bottoms are extra-heavy 3/16-inch alloy steel. By reversing the body adjustments, the Spread-Mobile can also be used for blotting oil with sand, chips, etc.

Bodies are available in 9, 11, and 13-foot lengths (longer on special order) with a water-level capacity of 20½ cubic feet per foot of length. Higher sides can be furnished if desired. Direct power takeoff or auxiliary engine drive are provided at the customer's option.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 702.

The new Baughman material spreader features a distributor plate at the left center of the chassis instead of the rear; this gives better traction by spreading skid-proofing material ahead of the rear wheels and well under the first wheels.

Hard-Facing Alloy

A new hard-facing electrode which gives a deposit material consisting of chrome, manganese, silicon, and iron alloy is offered by Wall Colmonoy Corp., 19345 John R. St., Detroit 3, Mich. Wallex No. 2 is said to have good abrasion and shock resistance and has stainless qualities approximately equivalent to type 410 stainless steel.

The deposit of this electrode has a hardness ranging from 49 to 53 Rockwell C. It is available as electrodes in ⅛, 3/16, and ¼-inch diameters x 14 inches long. It is packed in 25-pound corrugated paper cartons with directions for application enclosed.

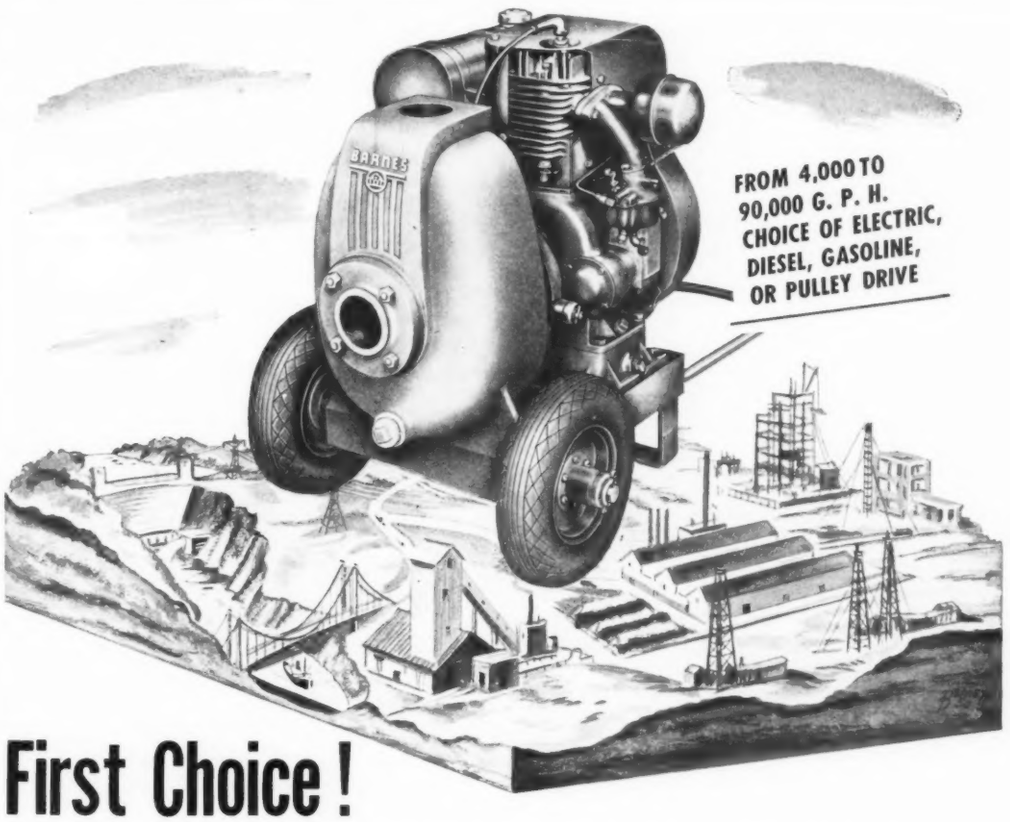
Typical uses are on teeth, buckets, grousers, guides, blades, and links.

Further information may be secured from the company. Or use the Request Card that is bound in at page 18. Circle No. 726.

Sales Rep. for Universal

Henry W. Gabbe has been appointed Sales Representative for Universal Concrete Pipe Co., Columbus, Ohio, manufacturer of concrete-pipe forms, block machines, and reinforced-concrete bridges (package design). He will be located at the new Jessups, Md., plant where he will handle engineering design and sales of the company's complete line of manufactured concrete products.

The Jessups plant, 12 miles southwest of Baltimore, held its open house last August.



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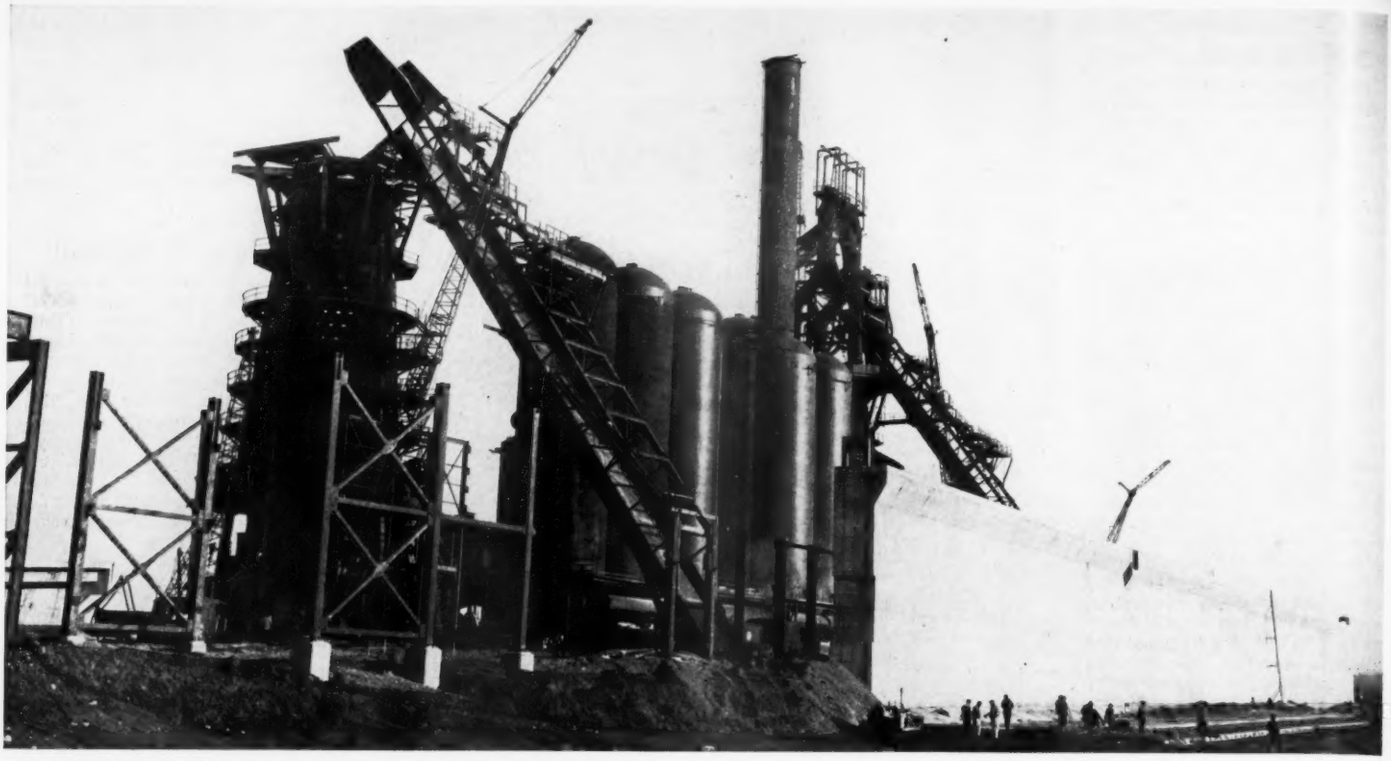


The Fairless Works of U. S. Steel is fast taking shape. Ore for use in the two blast furnaces shown here—one at each end of a row of six stoves—will be stored in the ore trough bounded by this concrete wall. Most of the ore is expected to be foreign.

New Steel Mill Is Shaping Up After Year's Work

Structures Rising Fast Above Foundations as Big Grading Job Nears Completion at Fairless Works in Pennsylvania

By WILLIAM H. QUIRK,
Editor

• ALTHOUGH construction of Fairless Works began only in March, 1951, the huge "steel plant of tomorrow" is already fast taking shape, and some of its mills will soon be in operation. On the 3,800-acre site south of Morrisville, Pa., the towering structures of United States Steel Co.'s big, new, $400,000,000 plant are rising from massive foundations of concrete and steel. Every possible kind of construction was in progress when the job was visited last spring, for grading was still under way in some locations, roads and railroads were being put down, and buildings were going up all over the area.

Early last year when we visited the project, the large tract of land had not yet entirely lost the rural look it had acquired from centuries of farming. (See CONTRACTORS AND ENGINEERS MONTHLY, July, 1951, pg. 75.) But by last spring all had changed. The Walsh Construction Co. of Davenport, Iowa, and its associates on the project, had given the landscape the unmistakable silhouette of a steel plant.

Working with Walsh on the joint venture are B. Perini & Sons, Inc., of Framingham, Mass.; Slattery Contracting Co. of Maspeth, N. Y.; and S. J. Groves Contracting Co. of Minneapolis, Minn. C. J. Langenfelder & Son, Inc., of Baltimore, Md., did extensive dirt-moving under a grading subcontract. Besides the grading, drainage, roads, and railroads, the general contractor is handling all foundation and concrete floor work. Above the foundations, the American Bridge Division of United States Steel is erecting all structural steel and the corrugated-steel siding and roofing material.

Multi-Job Project

According to the contractor, the steel-works project resolves itself into nine major jobs, each of which is larger than the average "big" construction project. These nine are:

1. A slip, 350 feet wide x 2,000 feet long and with a depth of 27 feet, to handle water shipments of raw material to the plant.
2. Two batteries of 87 modern by-product coke ovens each.
3. Two blast furnaces with a combined annual capacity of approximately 1,200,000 tons of pig iron, for use in the
4. Nine open-hearth furnaces which have an annual capacity of 1,800,000 tons of steel.
5. Power house, booster and control stations.
6. Rolling mill.
7. Sheet and tin mill.
8. Pipe-producing plant for National Tube, Division of United States Steel.

Another wall bounds the slip at the south end of the tract where an ore dock will be built for unloading foreign iron ore. This B-E crane handles an Insley concrete bucket.

C. & E. M. Photos

Universal forms were used for all building foundations—here, for the foundation walls of the office building in the Coal Chemicals Plant.

9. Disposal plant and pumping station.

An area superintendent is in complete charge of the construction going on within each of these nine area projects. He reports to the General Superintendent who is responsible to the Project Manager. Equipment and materials for each job area are assigned by the latter.

The design, engineering, and general supervision of the work are handled by the Construction Engineering Bureau of U. S. Steel. Work in each of the job areas is laid out by an area engineer who reports to the Chief Engineer. Constant coordination is maintained among all areas to insure an adequate flow of men, materials, and equipment as they are needed.

Grading

Originally the grading item was estimated to be about 8,000,000 cubic yards, but as the designs near completion it is apparent that this will overrun considerably; it is now expected that the dirt-moving will be about 10,000,000 yards. Excavation for the slip alone will total nearly 2,000,000 yards; it was completed to within 10 feet or so of finished grade by the middle of this year.

The slip is being dug at the south end of the tract, with only a narrow strip of bank separating its outer end from the Delaware River skirting the east and south sides of the property. An ore dock, approximately 1,000 feet long, will be built in the slip for unloading foreign iron ore which is expected to come chiefly from the Orinoco Mining Co., a U. S. Steel subsidiary in eastern Venezuela. This foreign development will not be ready for a few years, however, so in the meantime domestic ore will be shipped in to the plant by rail. It costs more, incidentally, to transport ore to Pittsburgh from the Mesabi range in Minnesota by land, than it does to ship ore by sea from Venezuela to the docks on the Delaware. Fairless Works will have two large-capacity ore loaders, and a traveling overhead bridge crane with a 22-ton bucket.

All excavation at the slip has been done in the dry with the help of Moretrench wellpoint systems. This is noteworthy since the highest point on the present plant area is only 20 feet above sea level, and the water table is high over the entire area. In fact whenever any excavation went below 2.0 elevation, wellpoints were found necessary. In addition to the slip area, some 40 different wellpoint setups were installed around the project—36,000 linear feet of them, in all. The slip is enclosed within a sheet-pile bulkhead, topped with a concrete cap and tied back to a row of anchor piles.

Equipment used by the general contractor for the grading, road building, and foundation work included 53 excavators — shovels, draglines, and cranes; 42 tractors and dozers; 5 motor graders; 28 Euclids, both bottom and end-dumps; 46 trucks; and 3 semi-trailers. Langenfelder on the dirt-moving also had an impressive fleet of equipment including 5 draglines; 16 tractors and dozers; 25 tractor-scraper units; 14 Tournapulls; 3 Caterpillar DW21 scrapers; 6 motor graders; 2 Euclid loaders; and 42 Euclids, both bottom and end-dumps.

The bulk of the dirt-moving in the slip area was done with the Euclid loaders and wagons. Total depth of excavation is to be 37 feet, from elevation 10 of the original ground down to minus 27. High water in the river is at elevation 9.

Sand and gravel mixed with river silt taken out of the slip area came in handy to provide fill at some of the building sites, and for the roads and railroad embankments.

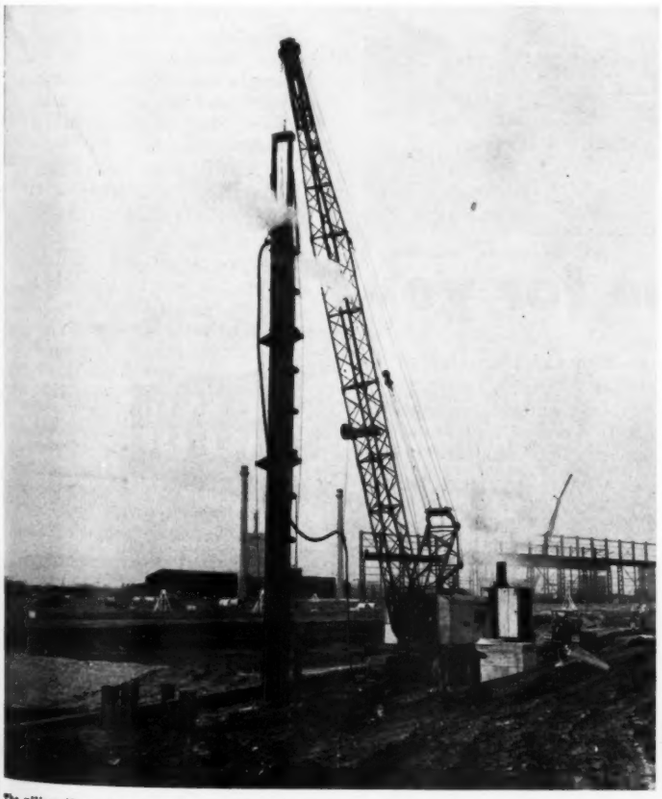
Despite the large amount of excavation, however, suitable material for base-course construction for the maze of roads soon became scarce. The works will have 16 miles of permanent roads, plus temporary roads reaching to the various project areas.

Road Work

Roadways range from 32 to 48 feet in width. Permanent roads have an 8-inch base course of stone topped by 4 inches of macadam and 2 inches of plant-mix. Temporary roads consist of a layer of either gravel, traprock or slag, of varying thickness depending on conditions, that is shaped and compacted.

Grading is a heavy item, about 10,000,000 yards in all. Here in the borrow pit near the sheet and tin mill a Cat DW21 scraper loads, helped by an Allis-Chalmers HD-19.

And here a Euclid loader feeds bottom-dump Euclids with material excavated from the slip and unloading-dock area. A Moretrench wellpoint system kept the big hole dry.



The piling item, too, was large and varied—nearly 1,000,000 feet of steel H-piles. This one will support a concrete footing for a pipeline.

In addition to the road work, over half of the 75 miles of railroad track has already been laid at the site. Material shipped by rail is being unloaded at the rate of 35 carloads a day. Cranes, both truck and crawler, handle a large part of the unloading.

Trench excavation came to 350,000 cubic yards for laying some 166,000 linear feet of drainage pipe that ranged in size up to 96-inch diameter. Over 1,000 manholes were built for the various underground facilities.

Foundations

The piling item was likewise large and varied. Nearly a million linear feet of steel H-piling was driven for the many foundation structures. A typical foundation pile in this category is a 14-inch H-beam, 50 feet long. Steel sheet piling amounted to 350,000 linear feet, the slip alone accounting for 70,000 feet.

About 640,000 cubic yards of concrete will be poured in the construction of the plant, and this will be reinforced with 38,000 tons of steel. An average of 2,000 yards is being placed a day, the concrete being delivered to the forms by a fleet of 39 truck mixers that are loaded at two batch plants on the site. The plants have a combined capacity of 250 yards an hour. Warner Co. of Philadelphia supplies the sand and gravel aggregate from local pits, while Universal Atlas furnishes the bulk cement. Each plant has a Blaw-Knox 400-ton aggregate bin and a Butler 3,000-barrel cement silo.

Universal forms, with wood sheathing and metal hardware and clamps, were used for all building foundations. Concrete was either chuted directly into the forms or discharged into buckets handled by cranes. The latter procedure was used, for instance, in building the high ore-trough walls along the slip at the blast-furnace area. A total of 713,000 square feet of membrane waterproofing was mopped on the foundations for the structures. Cooney Bros. of Tarrytown, N. Y., held a subcontract for mixing and delivering the concrete to the forms.

Within some of the big mill buildings, concrete for the thick floor slabs was placed after the fashion of a road-paving job. Forms were laid out in parallel rows, dividing the huge interiors into 20-foot lanes. Truck mixers backed into one end of the building and discharged the concrete into Johnson Lo-Slump buckets. These big buckets had been used by Walsh in the construction of Clark Hill Dam on the Savannah River, and held 4 yards of concrete. For this job they were built up with side lips which gave them a capacity of 5 yards.

The permanent overhead cranes that rolled along spanning the entire width of the mill handled the heavy buckets and their contents. For easier loading from the truck mixers, the buckets were lowered into holes below the level of the ground. After the cranes emptied the concrete into the forms, the screeding was done either by hand or by finishing machines. The latter were used for the large slab pours.

Good Progress

Despite the complexity and size of the project, and the material shortage, including steel, good progress is being made at Fairless Works. The sheet and tin mill was scheduled to be in production by the middle of this year; coils of raw material were to be shipped in to make this possible. The power house and disposal plant are also scheduled for early completion. By the end of 1952, the slip, coke ovens, open-hearth, and blast furnaces are expected to be in operation. During July the first ore shipments began arriving at Morrisville by rail.

Walsh Construction Co. and its associates is employing an average force of 3,500 on the project. Other contractors and the employees of U. S. Steel bring the total personnel engaged on the construction to approximately 10,000. For the general contractor H. H. Dugan is Project Manager, and J. J. Murphy is Assistant Project Manager. Steve Richards is General Superintendent, and D. D. Bentley is Chief Engineer. J. H. Weidman is Office Engineer.

(Concluded on next page)

Steel Mill Shapes Up After a Year's Work

(Continued from preceding page)

Housing Required

Upon completion, it is expected that the local operations of Fairless Works will employ about 6,000 production, maintenance, and clerical workers. While Trenton, N. J., is just across the Delaware from the Morrisville, Pa., site, and Philadelphia is only 25 miles downstream, most of the steel workers will be housed in new developments that are springing up in Bucks County not far from the plant. Two of these major developments are only a few miles south of the mill site.

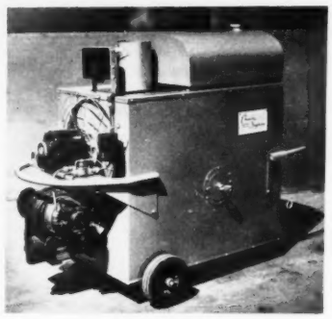
The Danherst Corp. has a 1,200-acre tract known as Fairless Hills where it plans to build 4,500 low-cost homes of which 1,100 are already completed. Levitt & Sons, Inc., expects to erect on a 2,000-acre plot 16,000 homes in a development called Levittown, Pa. The steel mill is attracting many satellite industries to the area, which will result in a huge population growth in a very short time.

Portable Space Heater

An oil-burning space heater with fully automatic electric control is offered by Chausse Mfg. Co., Inc., 4453 Fourteenth St., Detroit 8, Mich. Model B250 features complete separation of the products of combustion from the air stream, safety stack switch, automatic fan and safety-limit switch. Unit will operate at any angle.

The unit supplies 2,400 cfm at 125,000 to 250,000 Btu. Its capacity may be increased by changing the fuel-oil nozzle, accessible from the rear of the burner. Overall height is 42 inches, width 24 inches, and length 50 inches. The heater has a fuel capacity of 20 gallons and consumes from 1 to 2½ gallons per hour. It burns kerosene, and No. 1 and 2 fuel oil.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 701.



The Chausse Model B250 space heater.

Turnpike-Opening Delay

All 88 miles of paving on the Oklahoma City-Tulsa Turnpike will be completed by January 1, 1953, the scheduled opening date, but it doesn't look like a New Year opening for the pike. It's the steel strike that's throwing everything out. Of the 66 bridges on the highway only four are completed so far and enough steel has been delivered to build ten more. But there are still 52 to come and contractors are stuck for deliveries. One company has asked for a revalidation for a third-quarter allotment of 1,000 tons, and if this goes through the turnpike opening will be delayed only three months.

This modern machine is next to infallible—yet even so, the Bethlehem operator checks the reduction of his wire.

His attention to detail means better rope for you

Wire-drawing is a fundamental step in the making of Bethlehem rope, and it's done on machines that almost never make mistakes. Nevertheless, this operator, like others in the Bethlehem mill, runs frequent checks on the work going through. He wants to be sure that his part of the job meets the specified standards—which are very, very high.

This care, this attention to detail, is not confined merely to the drawing of wire. It begins with the making of the steel used in Bethlehem wire rope, and it carries through each and every step to the final inspection and reeling.

Care is a lot of *little* things which, taken together, mean a quality product. It is one of the reasons why you cannot buy a better rope than Bethlehem makes.

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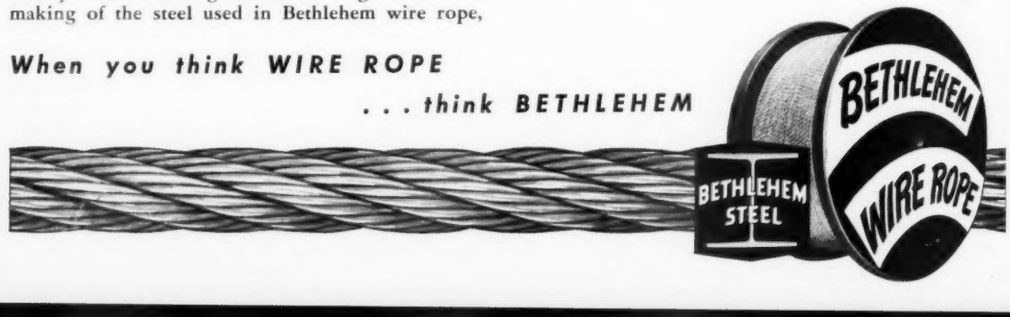

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Reservoirs Protect Agricultural Valley

Sub-Watershed in Texas is Given Upstream Protection: U. S. D. A. Lets Contracts for Earthfill Barriers

• IN the Deep Creek sub-watershed of the middle Colorado River in central Texas, engineers and contractors are busy on what may be a much more commonplace project in the future. Instead of a flood-control plan they are building flood prevention into the terrain of a valuable agricultural valley 16 miles long. When they have finished, their work will stand as permanent help to downstream flood-control works, and what is even more important, it will be of direct and immediate help to the farmers who live within the valley.

Region 4 of the Soil Conservation Service of the U. S. Department of Agriculture designed and is supervising the project. Like its sister project on the Washita watershed in Oklahoma, the Deep Creek undertaking is designed to hold rainfall close to where it hits the land. The reservoirs it forms will serve men and farm animals.

Altogether, eight sites for dams and reservoirs have been located on the Deep Creek drainage, some with cost-benefit ratios as high as 4.85. Two of the dams have low cost-benefit ratios and, for the time being, are being held in abeyance. But three of the important sites are now covered by finished dams, and as funds are appropriated by Congress, the others will also be built.

Other sub-watersheds on the middle Colorado are surveyed and work is about ready to go. These include Mukewater, Clear Creek, Jimned Creek, and Brady Creek. Construction has begun also on the Trinity River watershed, up high, in Texas, as well as on several other streams. One project, Sandstone Creek on the Washita watershed in Oklahoma, has a complete 24-dam system in and ready to work when the first destructive rain hits that vicinity.

It is fairly apparent, too, that the contractors like the class of earthwork called for in these jobs. Although the earthwork must be strong, with average 95 per cent compaction requirements, hauls are short and engineering is adequate but not overstaffed. As a result, contractors have been bidding earthwork on a large average of the projects for 22.5 cents per cubic yard, including excavation, hauling, processing, and compaction. A dam 4,300 feet long and a maximum of 32 feet high at Site 8, designed to hold a maximum of 1,416 acre-feet, was built at a contract cost of only $110,000. These Department of Agriculture flood-prevention dollars are not plentiful, so every effort is being made to stretch them as far as possible and still to deliver sound works.

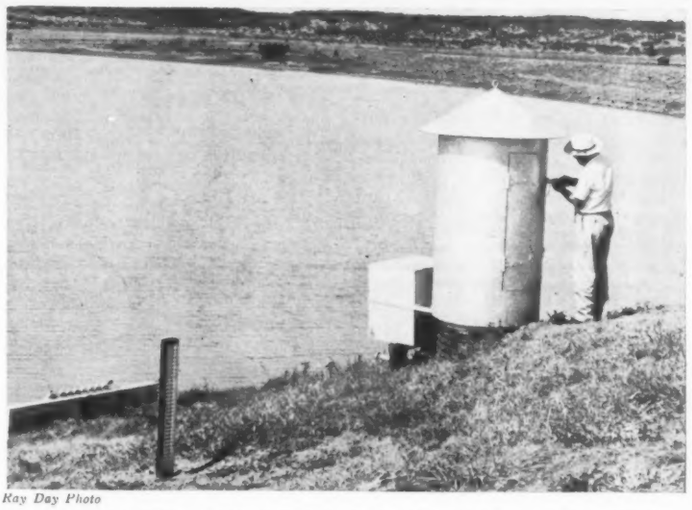
One of the radical differences apparent from the start on the Deep Creek project is the fact that all the land for the dams and reservoir areas was donated, free of charge to the Government, by people interested in building flood protection into the land. Local soil-conservation districts, county commissioners, and farmers are working together beautifully to make a truly grass-roots beginning on the system.

The Watershed

Deep Creek is a small, normally dry stream which is flanked on both sides by steeply sloping valley walls. Rains of heavy intensity have a way of bringing the stream up out of its banks, damaging fields, fences, and buildings. The system of reservoirs is expected to reduce the number of destructive floods considerably and, of course, the conservation of this water near its source will be of practical benefit to the community.

The stream rises about 2 miles east of Rochelle, Texas, and flows in a northeasterly direction for about 16 miles, emptying into the Colorado 1½ miles northeast of Milburn. Its principal tributaries are Dry Prong and Rough Creek. The average annual rainfall is 25.07 inches, about 70 per cent of which falls between April and Octo-

(Continued on next page)



Kay Day Photo

Construction Engineer Bruce unlocks a gaging station at Site 8. The permanent diversion for outlet of water is shown lower left, with the reservoir in the background.

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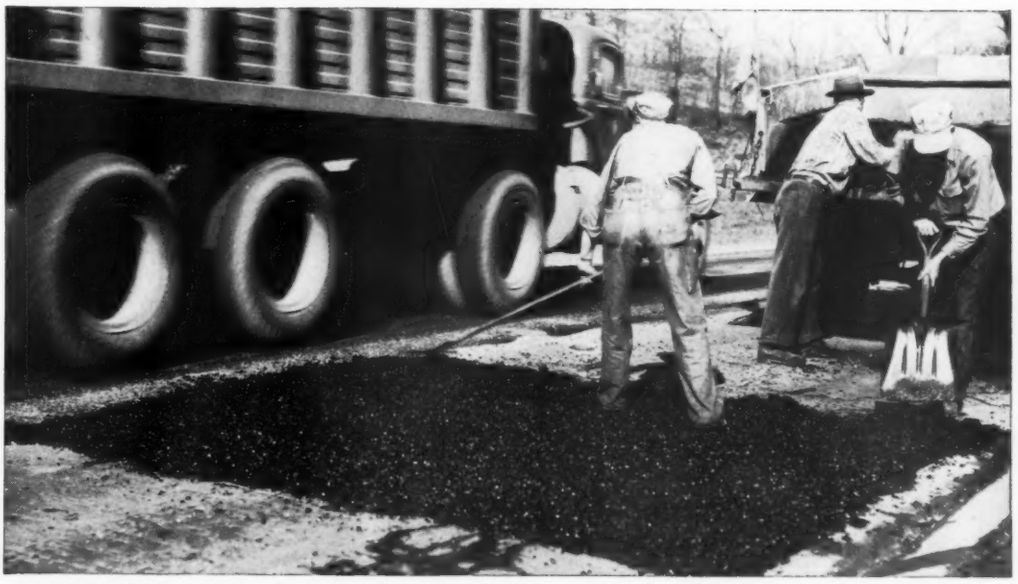

THE PATCH under the moving truck was opened to traffic immediately. Notice, too, that Komac Premix does not stick to tools.

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KOMAC Binders, offered exclusively by Koppers, mix easily and quickly with local aggregate. Since KOMAC Premix stays workable in the stockpile for a year or more, it is immediately available for use when you need it most. *Koppers trademark

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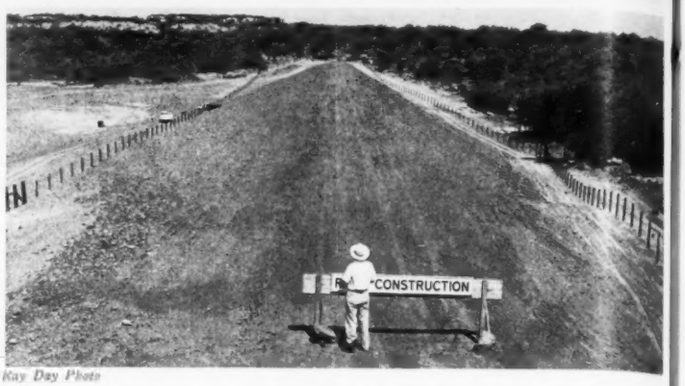
Reservoirs Protect Agricultural Valley

(*Continued from preceding page*)

ber. Since this coincides with the agricultural season, flood damage usually affects about 75 per cent of agricultural affairs, and about 25 per cent of others. As a matter of fact, that ratio is about the same for all of Region 4, which includes the states of Texas, Oklahoma, Arkansas, and Louisiana.

The watershed contains 45,321 acres of farm and ranch land. Of this amount, some 11,055 acres is cultivated, and 34,266 acres is in range and pasture. The 3,909-acre flood plain has 1,740 acres in cultivation, with 2,169 acres of pasture.

The Edwards Plateau soils are found at the top of the steep escarpment ring-



Kay Day Photo

This is a view of Site 1—one of the best locations for a dam on the Deep Creek watershed. It is a well chosen site where the side hills forming the abutments are separated only by a narrow neck in the valley.

ing the west, south, and southeast parts of the watershed. They are fine-textured soils, and cover about 25 per cent of the watershed area. Reddish prairie soils occupy the central portion, or about 70 per cent. These soils are about 88 per cent fine and 12 per cent medium textures. The remaining 5 per cent of the watershed area, along Rough Creek in the northeast, is classified as a cross-timber soil. They are 59 per cent medium and 41 per cent coarse-textured.

Topography varies from gentle slopes and flats along the valley floor to a steep escarpment with maximum slopes of 50 per cent along three sides of the watershed. Local relief varies from 50 feet on the east divide to 150 feet on the west. The upland area above the escarpment has slopes of 5 per cent or less.

The normal capacity of the creek channel is about 240 cubic feet per second, but one 9.29-inch rain which fell in 6 days produced 5.85 inches of runoff and jumped the channel to 37,500 cfs almost overnight. It is a repetition of such a disaster that the new works are expected to prevent.

In fact, about 1,200 acres of floodplain land highly suitable for cropland have never been cultivated, because of the frequency of flooding. Farmers and ranchers say that when the dams reduce this flooding, they may place these acres in cultivation.

Dam Designs Made

The Deep Creek watershed structures are all similar, even though they vary considerably in size. The dams are single-zone affairs, with embankment dirt obtained generally from the borrow-pit area inside the permanent-pool area. Each dam has an impervious earthen core wall built to shale or rock which underlies the valley about 18 feet deep below the normal ground surface. Outlet works consist of pipe with watertight joints; the pipe is embedded in concrete to the spring line. The intake is sufficiently high for a permanent detention pool to be held in the borrow area ahead of the dam. Officials expect this permanent pool to function also as a desilting basin, and if it should ever fill, the dams will still give flood protection.

Each dam tapers from the crest on a 3-to-1 slope upstream, and a 2-to-1 slope downstream. This design is typical of Deep Creek, but dams with other slopes have been built elsewhere. The dams are being planted with grass and fenced, along with the grassed spillway area, to demonstrate controlled grazing to the local farmers.

Each dam was designed according to common engineering practice. For example, expected peak rates of runoff were calculated by the Rational Method ($Q = CIA$), using a coefficient of runoff of 0.6 for the 25-year frequency storm and 0.9 for the 100-year frequency storm. Rainfall intensities were taken from Yarnell's bulletin on "Rainfall Intensity-Frequency Data".

Using a mass rainfall curve constructed according to the charts in Yarnell's bulletin, maximum amounts of rainfall were estimated for different

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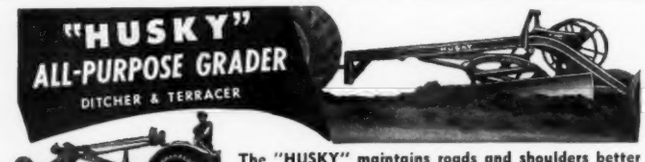

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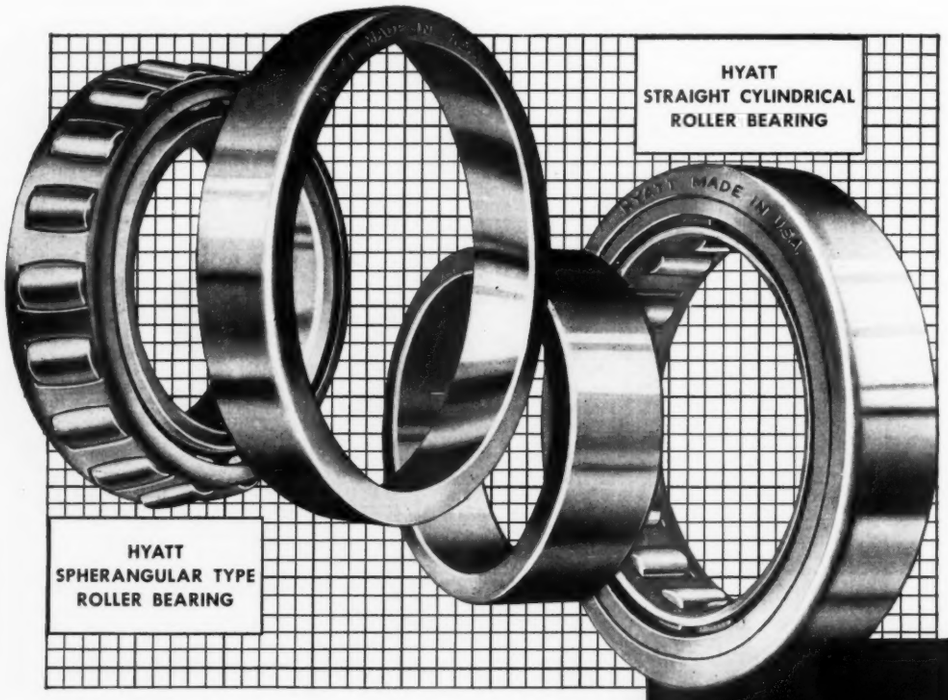

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HYATT ROLLER BEARINGS

Ray Day Photo

These men built Site 1 on the Deep Creek project. W. A. Bruce (left), Construction Engineer for the SCS, talks to Contractor Ford Allen.

storm durations, and the expected infiltration was deducted from the mass rainfall. On the middle Colorado, the infiltration in inches per hour was estimated at from .20 to .10 for the 25-year storm, and at .05 for the 100-year storm.

The design of the detention pool was based, on a drainage area of 4,000 acres or less, on the computed runoff from a 25-year frequency rain. For 4,000 to 7,000 acres, ranges were established from computed volumes of 25-year and 100-year storms. For 7,000 acres and over, the 100-year data was used entirely.

Contracts Let

Contract work on the various dams completed so far has been progressing well, and gratifyingly fast. In the order in which they were let, the various dams were as follows:

Site 8, Dry Prong Tributary: Site 8, started in April of 1951 and completed January 31, 1952, was built by Fred Hall & Son of Valley Falls, Texas, at a contract cost of $110,000. Despite the fact that this dam is across a dry tributary, it has already trapped enough rainfall to have its permanent flood-storage pool full almost to the intake lip of the outlet pipe.

This earthen dam, 4,300 feet long, rises at its highest point 32 feet above natural ground. In addition to the main dam, there is a 950-foot gully plug and about 2,200 feet of diversion channel above some nearby agricultural lands to drain water away from the fields and route it around to the reservoir. The drainage area above Site 8 amounts to about 3,465 acres. Typical data for this dam represent in similar fashion what the other dams will do, as shown in the following table:

Elevation*	Surface Area	Acre-Feet of Storage	Runoff Storage in Inches
202	6.16 acres	16.00	.06
207	20.82 acres	86.15	.30
212	29.61 acres	214.61	.74
217**	55.74 acres	430.02	1.49
222	96.09 acres	797.23	**2.76**
227	150.99 acres	1,416.00	4.90

* Elevations are referenced to assumed datum
** Flood storage starts at elevation 217.0

Hall moved in with 2 sets of Gebhard sheepsfoot rollers, 4 Wooldridge Terra Cobras, a pair of 15-cubic-yard LeTourneau Carryalls, 2 International TD-14's, a TD-24, a Caterpillar D7, a No. 12 Caterpillar motor grader, water trucks, and disks for processing and blending the moisture into the soil.

The site was cleared of small trees and brush, which was piled and burned. The entire permanent-pool area, which was also the borrow pit, was cleaned up, too. One of the first operations was the excavation, with tractor equipment, of a cutoff trench about 8 feet deep to key the dam to underlying shale. Core borings taken in each of the reservoir sites show where choice soil is located, and this cutoff was built from that material.

After the installation of the core trench and the outlet pipe, the 200,000 cubic-yard dam was built and the spillway was excavated. The earth was placed in 6-inch layers or less, and an average of 6 passes of the sheepsfoot rollers was necessary at optimum moisture to deliver 95 per cent densities. All soils investigation, incidentally, is done in a soil mechanic's laboratory of a neighboring regional office of the Soil Conservation Service in Albuquerque, N. Mex., but local tests and density checks were done in the field.

Plywood-faced forms were built to shape the concrete inlet boxes and other concrete work, and the small yardage of concrete was mixed at the site and placed in the forms.

Grassing of the dam slopes, crest, and the spillway consisted of a planting of King Ranch Bluestem, Side Oats Grama, Bermuda, and Buffalo grass. Studies are now under way at Stillwater, Okla., to determine the resistance and behavior of various sods and grasses under the action of running water.

Site 1: This dam is on the main creek, in one of the best natural locations on the stream. Reaching across a 1,350-foot neck between two rocky abutments, the dam rises about 35 feet off the natural stream bed. Started March 17 by Ford Allen of Sonora, Texas, final completion is expected by August 31, 1952. Allen's contract was for $66,000. The dam will have a permanent storage pool of about 300 acre-feet, with flash storage close to 1,700 acre-feet.

Like Site 8, this was also a job for tractor equipment. Allen, supervising his own operations, used 2 Caterpillar DW10's, a 15-yard LeTourneau Carryall pulled by an International TD-24, two D8's for push cats, a 1,250 and a 1,500-gallon water truck, an Adams motor grader, and Tampo 502 sheepsfoot rollers.

The permanent-pool and dam areas on this site were covered by especially heavy brush, and a clearing method common in this part of Texas was used to remove the trees. A 400-foot length of heavy battleship anchor chain was attached to the drawbars of one of the D8's and the TD-24, and the machines pulled the trees down over a swath

(Concluded on next page)

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Reservoirs Protect Agricultural Valley

(*Continued from preceding page*)

about 50 to 75 feet wide. The downed brush was then stacked by a dozer, and burned. Considerably more grubbing and root picking had to be done when the dam was built, to remove every trace of objectionable debris.

On this dam, early excavation for the core trench disclosed a thick gravel pocket with a distance of about 17 feet to shale. The location of the dam was shifted slightly to escape this deep formation, and the dam was completed in about the same manner as Site 8. Abnormally dry conditions made it necessary to haul water about 1½ miles during the latter part of the job, but during the early part of the work a sump near the center of the borrow pit provided enough water to put in the fill. This dam was seeded with a similar grass mixture, and its spillway was also cut through a natural saddle off to the right of the dam.

Site 4: Site 4, under construction by Roland L. Shearer of Weatherford, is a small $25,000 structure on which there is a 90-day time limit for construction. Its cost just about balanced out available appropriations for the current fiscal year, and it was possible to build this one rather than a larger structure on which funds were not available. It is well known, of course, that good Government engineers do not turn unspent appropriations back to the Treasury Department if they have works to fit the funds.

The equipment spread for Site 4 is small. Three 18-cubic yard Caterpillar 80 scrapers behind D8's, a pair of D7's with dozers for brush clearing, processing and compaction equipment, and that's it. It is expected that this site will be completed well within the contract time.

Others for the Future

At the present time, the other 3 structures proposed for immediate construction will be contracted whenever appropriations are available. The Soil Conservation Service likes, wherever possible, to complete the works on one stream at a time, rather than to build widely dispersed works on many streams. It feels that better data can be obtained for future works if results of completed systems can be evaluated.

Good contractor cooperation is being developed, and there is a list of 75 modern small contractors, all with good equipment, who receive SCS bid notices. The jobs are pulling from 8 to 14 bids, and competition is keen.

At the same time, a new awareness of the vital necessity for upstream flood prevention is being fostered among the people. Farmers in the watershed are working closely with the San Saba and Brady soil-conservation districts, and there are nearly 50 farmer-district soil-conservation plans in operation. Officials believe that when a few of the completed systems have been tried out successfully, and when people become accustomed to the recreational possibilities on the various lakes, the small detention reservoirs will meet with growing public acceptance.

And in addition to the immediate relief from floods up in the high watersheds, the major storage and hydroelectric dams above Austin on the main-stem Colorado will be safer for a longer period of time, because of the silt input these smaller structures will have stopped.

Personnel

Region 4 is under the general supervision of Louis P. Merrill, Regional Director, assisted by J. W. Hammett and H. N. Smith. Designs were made by M. P. Frank, under the supervision of Chief Engineer James J. Coyle.

AASHO Picks Road-Test Site

The American Association of State Highway Officials has been working for the past three years on plans for a road-test project and has finally decided on a site offered by the Illinois State Highway Department. This site, which meets the AASHO Committee on Highway Transport's rigid requirements — climatic, precipitation, soil, grade, uniformity, geographic, and others—is on the future relocation of U. S. 6, a Federal-Aid interstate route between Ottawa and La Salle, Ill.

The new project is to be far-reaching and national in character. Researchers hope to obtain much important information from it as to present and future highway design, construction, maintenance, and financing.

Data on Equipment Line For Quarries, Gravel Pits

A 36-page catalog illustrating and describing gravel-pit and quarry equipment has been prepared by Smith Engineering Works, 532 E. Capitol Drive, Milwaukee 12, Wis.

It covers the Telsmith primary and secondary crushers; gyratory breaker, jaw, Gyrasphere, Intercone and roll crushers, apron and plate feeders; scalping, sizing, and washing screens; Super-Scrubbers and sand classifiers.

The catalog also contains information on belt and chain elevators, conveyors, bin gates, and Telsmith portable crushing plants. It gives comprehensive tables on sizes, capacities, weights, and power requirements.

This literature may be obtained from the company by requesting Catalog No. 266R, or by using the Request Card at page 18. Circle No. 746.

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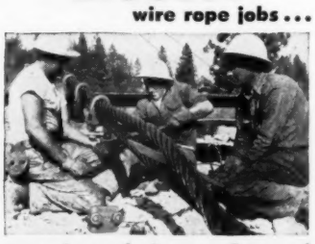

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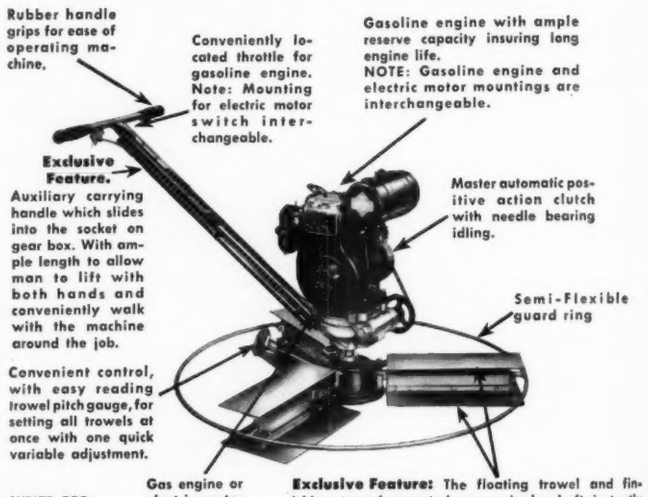
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Master automatic positive action clutch with needle bearing idling.
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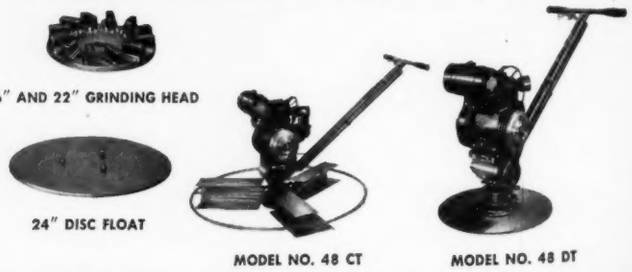

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Mounted on the Ford tractor and hydraulically operated, the Dearborn will lift 9 cubic feet or 1,000 pounds of material and dump it at any height up to 10 feet, 8 inches.

New Tractor-Loader

A new tractor-operated loader with a ½-ton lifting capacity and a 10-foot 8-inch lifting height has been announced by Dearborn Motors Corp., 2500 E. Maple Road, Birmingham, Mich. It is designed for the Ford tractor. Two levers give the operator finger-tip control.

The loader's hydraulic pump is mounted on the tractor rather than on the loader itself. This is said to give a smooth, positive drive and enable the tractor to get closer to trucks for dumping the loader bucket. The separate hydraulic pump also leaves the tractor's hydraulic mechanism free to operate additional rear-attached tools. For example, the loader can be mounted on the front and a blade or angle dozer may be attached to the tractor's hydraulic mechanism on the back for double-duty operation.

Tractor tools include land levelers, post-hole diggers, scoops, mowers, blades, and loaders. Loader attachments are a material bucket, a snow bucket, a snowplow, and a crane.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 720.

Pull-Type Spreader

The new lower location of the tractor-powered distributor plate is among several improvements to the pull-type spreader made by Baughman Mfg. Co., Shipley Road, Jerseyville, Ill. On standard 3:50 x 6 tires, the plate is only 31½ inches above the ground. This assures an improved road-hugging spread pattern with less rebound, the company claims.

Other features of the Model SC-52 include positive locking tow hitch as standard equipment, giant-size rolled-edge hopper, and adjustable agitator and valve to regulate flow of material to distributor.

The unit will spread sand, salt, cinders, calcium chloride, chat, chips, etc., in a full 360-degree circle while moving either forward or backward. By spreading under the wheels of the truck, traction is greatly improved on slippery surfaces. Spread pattern can easily be controlled in width and direction (either right or left) by the adjustable deflector plates on both sides of the spreader, and by the angle of the distributor fins.

A spring-mounted lifting chain can be adjusted to lift the spreader wheels off the ground when the body of the towing truck is lowered. When the truck body is raised to dumping position, the spreader wheels touch the ground and spreading automatically begins.

Further information may be secured from the company. Or use the Request Card that is bound in at page 18. Circle No. 730.

Organized Safety—40 Years

Forty years ago a small group of safety engineers from various steel companies were determined to put a stop to the frequent accidents in their mills. They met in Milwaukee for the First Cooperative Safety Congress, and the National Industrial Safety Council was born. Today the National Safety Council is the clearing house for organized safety; and this month more than 12,000 members will meet in Chicago for its 40th Annual Congress.

The theme of the meeting will be the need for cooperation in the safety movement. Though emphasis will be placed on the progress that has been made in accident prevention since 1912, there will be no effort to minimize the size of the accident toll today and the huge problem it presents. More than 600 speakers will appear at 200 sessions covering every phase of safety. There will be 250 exhibits of all types of safety aids.

The Council estimates that 500,000 lives have been saved through the combined efforts of safety people during the past four decades. This figure is based on the accident death rate in 1913 and the rates for succeeding years.

Says Ned H. Dearborn, President, ". . . it is fitting that we should pause for a look backward, and find in the zeal and faith and devotion of a host of pioneers a renewed strength for our tasks of the future."

New Sales Mgr. for Baldwin

A. D. Bellows has been appointed Sales Manager of the Crusher Department of the Construction Equipment Division of Baldwin-Lima-Hamilton Corp., Lima, Ohio. He was formerly Crusher Sales Engineer for Austin-Western Co. Mr. Bellows has had almost ten years of sales and engineering experience with the A-W Crusher Division, which was recently moved to the Lima plant following the consolidation with Baldwin-Lima-Hamilton.

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S. O. Linzell Is Director of Ohio Highway Department

Samuel O. Linzell has succeeded T. J. Kauer as Director of Highways of the Ohio Department of Highways. Mr. Kauer left the Department in August to take over the job of Chief Engineer on the Ohio Turnpike Commission.

Mr. Linzell, who is 53 years old, is a registered professional civil and mining engineer, a member of the Highway Research Board Committee on Maintenance, and an ex-officio member of the Ohio Turnpike Commission. During World War I he served with the Canadian Field Artillery and in World War II he was attached to the U. S. Army Corps of Engineers as Civilian Engineer in charge of maintenance and construction of minor roads, runways, grounds, and railway installations in Ohio, Indiana, Kentucky, and West Virginia. With the Ohio Highway Department since 1928, he has risen from Assistant Engineer to his present position of Director. From 1949 to 1952 he was Director of the Ohio Public Works Department.

Trench Reference Tables

A revised reference booklet, "Trench Loading Tables", has been released by The Robinson Clay Product Co., 65 W. State St., Akron 9, Ohio. Based on the Marston formula, the tables were developed to help in computing trench work and to reduce the possibility of error in calculating backfill loads on clay pipe. Complete reference tables show the estimated load according to pipe size, trench depth and width, and type of backfill. The new revised version is designed to help organizations handle pipe projects faster, while maintaining high standards of quality.

This literature may be obtained from the company, or by using the Request Card at page 18. Circle No. 751.

Acid Etching Restores Identification Plates

It often happens that a name, a license number, or other information stamped on power-equipment identification plates becomes obliterated due to corrosion. Engineers at Sam Tour & Co., Inc., a New York City industrial consulting laboratory, have a method for dealing with this.

The method depends on the special response of cold-worked steel to acid etching (the die stamping of numbers on metal cold-works the metal). The area in which the obliterated information is known to exist is first cleaned with a solvent to dissolve the layer of surface scale, then the area is treated with an acidic solution. Result—the lettering becomes clearly legible.

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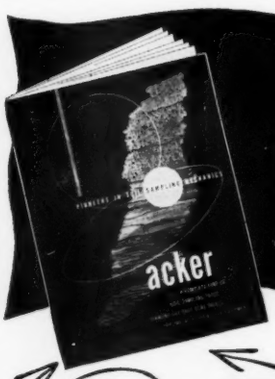

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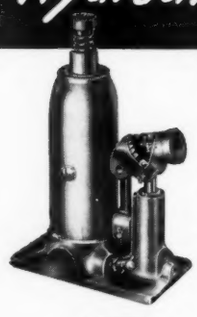

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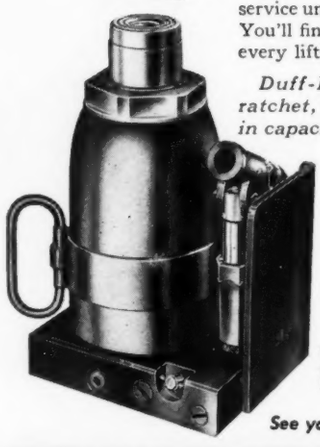

Write for Bulletin AD 16-D which describes and illustrates Hy-Power Hydraulic Jacks.

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Linear-Mile Bids Cut Cost of County Roads

County Highway Building Plan Helps Columbia Basin's Road Development Keep Up With Agricultural Growth

Kay Day Photo

A Gar Wood scraper is loaded by an Allis-Chalmers HD-19 on a linear-mile construction contract in Grant County, Washington.

• OUT in Washington's Columbia Basin country, where one of the biggest experiments with irrigation ever attempted is going on, county road builders of Grant County are performing an amazing experiment of their own. They are building roads by contract, on a linear-mile basis, so the highway pattern will somehow keep pace with other aspects of the county's growth. And the scheme is saving an estimated 50 per cent in engineering costs, as well as about 25 per cent in construction costs.

Bureau of Public Roads officials and representatives of the Washington Department of Highways have pronounced the highway building scheme successful. According to the State's 1952 priority schedule, roads in Grant County and the Columbia Basin country are near the top in importance to the state as a whole.

James H. Dodson, County Engineer at Ephrata who heads the road program, explained the savings in conventional costs this way:

"Contractors approach a linear-mile job with an entirely different attitude than when it's broken down into bid items. On an itemized job, a contractor forever hopes additions will be made to the profitable items, and he'll bid them high with that prospect in mind. On a per-mile contract, he knows the number of miles will remain constant. So he sharpens his pencil and does some sound figuring. We believe the bids are saving us about 25 per cent in contract costs, and we know the scheme is saving about 50 per cent in engineering costs."

Grant County had 67 miles under contract in June, when CONTRACTORS AND ENGINEERS MONTHLY visited the Ephrata setup, and routine maintenance was under way at an accelerated pace to get the roads ready for harvest season, some months in the future. Work was under way on arterials, feeder roads, and back roads with little traffic. The three equipment and repair yards in Grant County were virtually bare of equipment; it was almost all out working.

Scheme Has Sound Background

A sound basis exists for the present road-building spurt in this important county. To understand it, it is necessary to know and appreciate what a great change has come about in Grant County because of work which has been done by the U. S. Bureau of Reclamation.

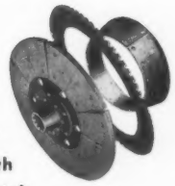
Until the Columbia Basin Project was conceived and begun in the 1930's by the USBR, Grant County was largely a sleepy agricultural tract of about 700 square miles, where dry farming raised a fairly good wheat crop each year. There was little travel on county roads except during the wheat harvest.

The completion of Grand Coulee Dam was the signal for the beginning of the Columbia Basin development. Water from Lake Roosevelt behind Grand Coulee Dam is lifted by pumps 283 feet, and is then delivered down through the Columbia Basin country through two principal feeder canals, at a rate of 6,600 cubic feet per second at the beginning of the irrigation system. The water, which was first turned in last summer, has already made the desert bloom and has brought new growth to the communities. Ephrata, Moses Lake, Soap Lake, Warden, and all the other towns are literally mushrooming. New buildings are going up everywhere. A new grain elevator is going up in Trinidad, in the western part of the county. The population is growing so fast that road maps only 2 years old are far out of date so far as the census is concerned.

Dodson and the Grant County com-

(Continued on next page)

. . . BECAUSE IT LASTS LONGER



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Linear-Mile Bids Cut Cost of County Roads

(Continued from preceding page)

missioners realized several years ago that an approximate 1,000-mile addition to the County's present 1,662-mile system was in the cards if the county was to furnish access to irrigation canals and new farms which the program would establish. Some excellent planning has been going on. As far back as 1949, the Washington Legislature recognized the rapidly developing situation, too. It authorized the State to issue bonds which will give Grant County about $5,800,000 for highway construction during the next 5 years. This will be a tremendous help, for the normal annual highway income is only about $300,000. This is derived from Washington's method of allocating 41 per cent of the gross revenue from 5 cents of its gas tax to counties, plus ¼ cent of the recent 1½-cent gas-tax increase. The State now has a 6½-cent gasoline tax.

Ray Day Photo

In County Engineer James H. Dodson's office, Dodson, right, confers with Frank Englehorn, his assistant, about road maintenance matters.

We Visit a Project

To see how a typical per-mile contract is conducted, a visit was made to the general vicinity of Quincy, where Carl Hohner & Sons of Spokane was busy with 15 miles of new construction on feeder routes. Started April 4, the job was scheduled for completion by July 1. It was moving along at a fast clip, with progress being figured at a mile a week.

The contract, which Hohner bid at $1,200 per mile, included only the raw grading necessary to make a 24-foot roadbed, side ditches, and 10 to 1 sideslopes within a 60-foot right-of-way. County arterials generally have 80-foot right-of-ways, but the narrower width is general on feeder roads because every square foot of land in the Columbia Basin is so valuable it is made into irrigated farmland rather than highway right-of-way. A crushed-rock surfacing will be laid under a later contract.

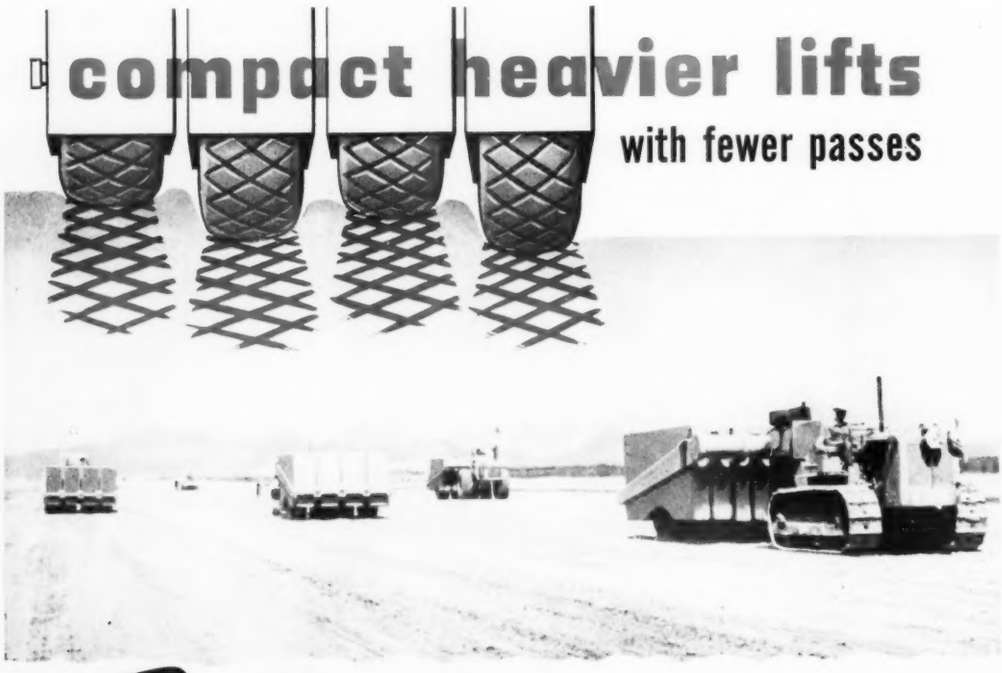
When the Hohner organization moved in, the preliminary engineering was done and the stakes he would work to had been set. They consisted of a line-and-cut stake on the center line, spaced at 100-foot intervals, with sideslope stakes roaded with cuts and fills set at 200-foot intervals. By staggering the 200-foot stakes, the County was giving the contractor, in effect, a sideslope stake every 100 feet. Hohner bid the job on the basis of cuts and fills on these stakes. In general, the deepest cut was 3 feet, the deepest fill was 5 feet, and the average haul distance was 550 feet one way. The formation was typical Columbia Basin farmland, ranging from fine silt and volcanic soil to sandy material.

Hohner turned in his excellent progress with a small fleet of grading equipment, consisting of an Allis-Chalmers HD-19 diesel tractor and a 24-yard-water-level Gar Wood scraper; an Adams Model 511 motor grader; and an International truck-mounted water tank of 2,000-gallon capacity. Some of the water was available nearby; some had to be hauled 2 miles. Water, fencing, and a few culvert pipes were let separately as extra items in the general contract.

Contract operations were under Carl Hohner personally, with his son Bob doubling, when necessary, as a superintendent or as the operator of the tractor and scraper. Each mile was carefully analyzed to move the dirt as little as possible. Close organization kept the water truck on the fill as the scraper was dumping dirt, and every effort was made to space the loaded scraper tires evenly over the roadbed to develop as much compaction as possible. With the exception of equipment compaction, no extras for this item were included in the contract.

Hohner estimated that a typical week's work, consisting of five 10-hour

compact heavier lifts with fewer passes



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Each wheel of the Southwest Compaction Roller is mounted in an independent weight-box unit. Hinge point of wheel is at extreme rear of its own weight-box. Closely spaced wheels give maximum compaction with as much as 12" variance in height. Offers oscillating freedom and greater compaction on uneven ground.

ON THE BIG JOBS use the Southwest Compaction Roller to keep pace with speedy, 24-hour job schedules and bigger earthmoving equipment. It compacts heavier lifts with fewer passes. Weight-box units oscillate up and down independently to provide a constant compaction weight on each tire regardless of ground contours. There is no bridging, no shifting of load.

The Southwest Roller has flexibility to suit varying job requirements. Weight-boxes may be filled with wet or dry sand, earth, scrap or other materials. Sectionalized hauling yoke permits use of any combination from 3 to 6 weight-box units. Sizes and capacities range from 10 to 200 tons, suitable for light, medium or heavy duty compacting of earth.

Type Soil	Symbol	No. of Single Passes	% Moist	FIELD Dry Density Lbs. Ft. 3 Passing #4 Actual	FIELD Dry Density Lbs. Ft. 3 Passing #4 Corrected	OPTIMUM % Moist Pass #4 Sieve	OPTIMUM Dry Density Lbs. Ft. 3 Pass #4	OPTIMUM Ratio Den.—Opt —Pass #4
Silty Sand	SM	6	7.3	128.0		8.0	133.6	96.0
Sandy Clay	CL	6	10.2	110.0		15.3	116.2	95.5
Sandy Clay	CL	6	14.3	114.0		15.3	116.2	98.0
Sandy Silt	ML	6	14.6	115.0		14.2	120.8	92.0
Clayey Sand	SC	6	9.2	125.2		10.2	128.3	97.8
Silt	ML	6	6.6	119.0		9.5	125.0	95.0
D.G	SW	6	8.7	126.7		9.2	132.0	96.0
D.G	SW	6	5.2	129.0		7.8	135.0	96.0
Straight Clay	CL	6	6.3	122.8		10.3	127.1	96.6
Pit Run	GW	6	4.8	133.5	126.5	7.7	134.5	95.0

The above data on unit weight of soil samples has been taken from average compacted fills placed in lifts from six to twelve inches as specified. The unit weight per pneumatic wheel load being 25,000 lbs

WRITE TODAY for illustrated folder which gives complete data and specifications.

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shifts, accounted for about 6,000 cubic yards of material, along with the finished grade work on the roadbed, ditches, and shoulders. Spare parts and supplies were maintained at the site in a small trailer built especially for that purpose. There was no pilferage of small tools and supplies because the trailer could be locked up at night.

How do the contractors feel about a linear-mile contract? They like it. "It gives us freedom and latitude, along with the responsibility for putting up a good job," said Bob Hohner. "We realize our reputations depend in large measure on what kind of a road we build here, and we like that challenge."

Not all the county jobs are let on a linear-mile basis, however, especially in sections where abnormally deep cuts and fills predominate, or where the nature of the material is not too well known. In these cases the standard form of contract, broken down into bid items, is used. But there is a growing feeling in Grant County that per-mile contracts can be let even on future Federal-Aid work when the 1,000-mile highway addition gets under way.

Maintenance: Big Item

Maintenance of existing highways is almost as important as the new construction program, because the maintenance activity is constantly bettering and bringing up to higher standards the various sections.

The present county road system includes 18.96 miles of high-type bituminous penetration on a rigid base; 167.86 miles of bituminous-surface-treated highway; 918.02 miles of crushed gravel or stone; 387.99 miles of graded and drained road; and 170.06 miles which are classed as "unimproved". In general, the arterial county roads leading to towns and grain elevators are bituminous-surfaced. Main feeder roads are graveled. Back roads are graded and drained, and are being brought up to higher standards as rapidly as possible by maintenance crews.

Grant County has three elective commissioners, and the maintenance department has three districts representing each commissioner, with the general program under County Engineer Dodson. Fred Ludolph of Grand Coulee is Chairman of the Board of County Commissioners, and the two members are Gordon Nicks of Ephrata and Albert Widmer of Warden. Frank Englehorn and Elmer Lair, Dodson's assistants, handle detail work in the Ephrata office. Maintenance Supervisors in charge of the three districts include Ped Cooley, District 1; Kenneth Sparks, District 2; and August Bepple, District 3.

At each district headquarters a shop is maintained, and each supervisor has equipment assigned to him to keep the roads in his district maintained. A complete bituminous outfit is owned and operated jointly by all three districts, going anywhere in Grant County where its services are needed. This outfit consists of a Highway material spreader, a Littleford Model R tank-car heater, a Huber 8-ton tandem steel-wheel roller, a 1,000-gallon Littleford asphalt distributor mounted on a 6 x 6 Studebaker truck, a 1,000-gallon asphalt supply tank, and a spare International truck for moving men and materials.

The three county headquarters shops are equipped very well for the repair and maintenance of the big equipment fleets which work the roads around them. All three shops are similar, but as a guide to the equipment in each, District 1's headquarters shop has the following:

1 Curtis air compressor
1 bench vise
1 Walker floor jack
1 Tungar battery charger
1 post drill
1 set taps and dies, valve-reseating and valve tools
1 valve refacer
1 Sioux drill
1 15-ton track jack
1 set pipe dies
1 Shield Arc welding machine
1 5-ton American hand hoist
1 1½-ton Yale & Towne open gear hoist

The major equipment for each district is designed for a typical maintenance-betterment program. District 1 has two No. 12 Caterpillar motor graders, a new Warco grader, a D7 Caterpillar tractor with a dozer, a 10-yard LeTourneau Carryall, a D6 Caterpillar tractor and dozer, a small Caterpillar-mounted shovel, 2 Pioneer portable rock-screening plants, an International tractor and mower, and a spray outfit for chemical weed control.

District 2 has a Model 12 Caterpillar, an Adams 511, and a Warco motor grader, a D7 with dozer, a 10-yard LeTourneau Carryall, Federal and International dump trucks, a Farmall B and a power mower, and a Bay City Model 25 shovel.

District 3 uses two Model 12 Caterpillar graders and an older Adams along with a new Warco machine, a D7 with dozer, a LeTourneau 10-yard Carryall, two older Caterpillar tractors with dozers, a Simplicity vibrating screen, Chevrolet and International dump trucks.

Each district has a variety of snowplows, because the removal of snow is the No. 1 headache for maintenance crews throughout the county. As a rule, the main portion of the plow equipment is all Wausau, and includes push plows for truck mounting, V-plows for motor-grader mounting, and a few V-plows for tractor mounting. The County has no rotary equipment because a tractor-mounted V will handle just about anything on the system.

Maintenance of roads of various types has been very well standardized in the three districts, through the cooperation of supervisors, commissioners, and the County Engineer. Graded roads are being maintained all year now instead of just in the spring and fall, which used to be enough. Gravel roads present an ever-increasing problem, because the Columbia Basin is a hot, dry area throughout the summer, and unless the rock particles are carefully bedded with plastic fines during the last wet weather of spring, they ravel out during summer months. Corrugations and washboarding are getting more common as more automobiles and

(Concluded on next page)

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Linear-Mile Bids Cut Cost of County Roads

(*Continued from preceding page*)

trucks use these back roads.

These conditions are being dealt with, however. When crushed material is set up for a base course, the specifications include enough minus 100 and 200 material to bind the larger particles together. In some cases, binder material is being hauled in and spread in thin lifts to tie the loose rock together. Dodson is also giving some thought to the use of calcium chloride in the future, and the nearness of irrigation canals all over the area may also make it possible to use sprinkler trucks and motor graders at 10-day intervals to do a better maintenance job on the gravel and crushed-rock roads.

So far as bituminous roads are concerned, there is probably no better county in the nation for this type of construction. Bituminous roads just naturally stand up under heavy traffic with a minimum of base course underneath, and the summer weather is ideal for their construction. Maintenance crews each year turn many a mile of gravel road into bituminous surfacing by the road-mix method.

MC-2 asphalt is the favorite bitumen for this type of betterment work. It is trucked in from Spokane and Seattle refineries, and delivered to the jobs at temperatures of about 260 degrees. Ambient air temperatures of 110 to 115 degrees in summer are not uncommon in the Columbia Basin, and since there are long periods without rain, road building is ideal. The aggregates are dumped and windrowed on the quarter point of the road, blade-mixed until they are surface-dry and uniformly blended, and the hot oil is then applied in sections from 1,000 to 3,500 feet long. The windrow is continuously mixed until the perfect blend has been made, after which it is spread by the same patrols and rolled by a steel-wheel Huber.

Considerable asphalt penetration work is also being done, usually in 2-course applications, using MC-3 asphalt and chips up to ¾ inch in size. On all asphalt work, county crews try to finish up anything they start before they quit work for the day, and while there are, of course, exceptions to this rule, it is generally followed.

What About the Future?

At the present time, county crews and equipment are teaming up with contractors in an all-out building and betterment program. But possibly no county has a more interesting future to consider, so far as highway building is concerned.

Up to now, Grant County has gotten by with typical dry-country construction. But water, lots of water, is being brought in artificially now, and turned loose along two main courses through the county. The Bureau of Reclamation has done the best job possible, within the laws of economics, to minimize seepage from the canals. But there will eventually be seepage. It may break out in a spring in the middle of a county road. It may make a lake and cover roadway sections. It could even cause washouts. It is no reflection on the USBR or an indictment of irrigation generally to be aware of these possibilities, and Dodson is very much aware of them.

He believes that the 1,000-mile addition can largely be built to grades which will hold seepage troubles to a minimum. As troubles develop in the present system, they will have to be intercepted and whipped. He believes the USBR will cooperate with Grant County in these cases, when and if they happen.

For county roads are assuming more and more importance in the pattern of living. Roads used by U. S. Mail vehicles, or routes traveled by school busses, must now be maintained for travel winter and summer, sometimes in spite of 3 feet of drifting snow with gales blowing. Dodson and his men have one of the most interesting county road assignments in the nation. How well a multi-million-dollar irrigation system works will depend, in some measure at least, on how well they measure up to this enormous responsibility.

New Headrest Goggle

An improved headrest goggle is now available from General Scientific Equipment Co., Philadelphia, Pa. The W-50 is of light easy-to-clean plastic and is adjustable to any head size.

Held against the face by concealed springs, the goggle is hinged from the sides of the headrest by telescopic arms. Molded plastic eye cups have ventilating screens to prevent fogging and baffle plates to keep flying particles away from the wearer's eyes. Standard 50-mm lenses, with cover glasses to check the filter lenses from pitting, are available in shades 3 through 6.

The Jackson headrest goggle No. W-50 has been improved for greater comfort and easier adjustment during welding, cutting, brazing, etc.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 787.

Head of Dodge Truck Sales

William S. Woolsey, former Assistant Director, has been promoted to Director of Truck Sales for the Dodge Division, Chrysler Corp., Detroit, Mich. He has had 30 years of diversified truck and automotive experience including retail selling, service, field staff, and factory sales work. Mr. Woolsey joined Dodge in 1939. He replaces L. F. VanNortwick who has entered a Dodge dealership.

More PUSH from

GAR WOOD offers a complete line of 12 new hydraulic and cable TipDozers and Dozecasters — perfectly matched to the new A-C tractors! TipDozers have tip screw for simple vertical blade adjustment of either end of moldboard, up to 12" max. differential. On Dozecasters angle of moldboard can be changed up to 25° in either direction. All Dozecasters also have tipping feature.

GAR WOOD GW INDUSTRIES

Machine Cuts Brush On Highway Slopes

In Columbus County in the southeastern part of North Carolina, the problem of cutting heavy brush on highway slopes is being solved with a Hall-Holmes all-position brush-cutting machine. This big unit, owned by the North Carolina State Highway and Public Works Commission, operates out of the maintenance camp at Whitesville, county seat of Columbus County.

In this section of the state, brush growth is particularly heavy, and maintaining trimmed slopes has always been difficult. This powerful machine, however, can handle 8 miles of double cutting in the average 10-hour working day. This includes both sides of the pavement—cutting the front slope to the ditch line, and then cutting the back slope up from the ditch line. The machine rides along on the shoulder of the road, and with its 8-foot blade can cut through the heaviest of undergrowth. By extending the arm of the cutting blade, the operator can reach out 15 feet from the edge of the shoulder.

At left, the Hall-Holmes brush-cutting machine at work on a North Carolina highway slope. When finished, the blade is laid back against the cab for the return trip to maintenance headquarters, as shown at right.

The blade operates under 1,600 pounds of hydraulic pressure, with an International Harvester gas engine working the pump. While cutting, the wheeled vehicle, driven by a Ford V8 gas engine, moves along at an average speed of 2 miles an hour. The machine has two transmissions.

When the day's work is finished, the operator can swing his blade around and lay it back against the cab which is at the rear of the machine. Then he can return to the camp shop at 40 or 45 miles an hour. This is a big saver in time and overcomes one of the objections to the ordinary mowing machine which, because of its limited speed, must stop work earlier in order to return to headquarters by the end of the day.

The brush-cutting machine is used primarily on slopes with heavy growths, leaving the shoulders to be cut with the conventional mowers. This unit operating in Columbus County is used on primary and secondary roads, since the State does maintenance on both types.

Bigger Power Plant For Fork-Lift Truck

Improvements are announced by Clark Equipment Co., Battle Creek, Mich., in its 15,000-pound-capacity pneumatic-tired fork-lift truck. The Yardlift-150 has a new power plant which is said to develop more horsepower at fewer rpm; a weight reduction of 2,300 pounds providing increased flotation; and improved hydraulic steering. In the event of motor stoppage, steering can be accomplished mechanically. A separate hydraulic system is used for the power steering.

A pivoted-type steering axle is standard on the Yardlift-150, to permit constant wheel contact during travel over uneven surfaces. New fork bars are narrowed vertically to help increase the driver's vision. The company claims that further aid to driver vision has been achieved by increasing the opening between upright channels and lift cylinders by 3½ inches. This new upright—made from rolled-steel sections for rigidity and strength—practically eliminates the possibility of twisting or spreading as a result of heavy cumbersome loads. The overhead guard rack is extra equipment.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 735.

Data on Centrifugal Pumps

A bulletin describing self-priming centrifugal pumps and diaphragm pumps has been issued by Carver Pump Co., 1056 Hershey Ave., Muscatine, Iowa. It contains complete information and illustrations about each unit as well as capacity tables. These self-priming centrifugal pumps are A. G. C.-rated units, 4,000 to 240,000 gph. The diaphragm pumps will handle up to 6,000-gph. Pumps have gasoline-engine, diesel, motor, or belt drive and can be mounted on wheels or skids.

This literature may be obtained from the company by requesting Bulletin No. 110. Or use the Request Card at page 18. Circle No. 764.

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NO. 525

In these two views we look east then west—away from and toward the tunnel-like RC arch structure which D. Arrigoni built to carry traffic over the railroad track at Bolton Notch. The two rigs seen fore and aft are a Lima and Koehring, both raising buckets with rock from the railroad cut.

Tunnel-Bridge Relieves Bottleneck

By WILLIAM H. QUIRK,
Editor

• A SERIOUS bottleneck in Connecticut highway traffic has been eliminated this year with the completion of a road relocation project at Bolton Notch, 15 miles east of Hartford. At this point U. S. 6 and 44-A, following a west-to-east direction from the state capital, diverge, with U. S. 6 angling off to the southeast, and U. S. 44-A continuing its easterly course. A stop sign halted west-bound U. S. 6 traffic before it entered the intersection, and the heavy flow of vehicles on east-west U. S. 44-A frequently resulted in long delays to motorists who were forced to make a left turn into a busy highway. Obviously, this situation was a hazard to safety as well as a traffic bottleneck.

Accordingly, the Connecticut State Highway Department designed a relocation at this important road junction to eliminate the intersection at grade. The Department awarded a contract for the project to D. Arrigoni, general contractor of Middletown, Conn., on a low bid of $528,244. Construction got under way in November, 1950, and was scheduled for completion by the middle of this year.

The presence of a single-track line of the New York, New Haven & Hartford Railroad, crossing under U. S. 6 and 44-A just west of the intersection, made this job something more than just a highway grade-separation project. Two structures instead of one were necessary. A three-span composite beam bridge, with a clear span of 118 feet on the center line, separates the intersecting highways. The railroad goes through a tunnel-like reinforced-concrete arch structure built over a deep gorge cut into the rock. A dirt fill, 4 feet thick at the top of the arch, serves as a foundation for the four-lane highway that crosses over the railroad.

Two New Structures

With a total length of 3,370 feet, the project includes two new structures, and connecting pavements of 8-inch-depth reinforced concrete. On the Hartford or west side of the relocation the pavement consists of four 12-foot traffic lanes, while at the east and southeast ends the lanes vary from 10 to 12-foot widths for the diverging routes. Around the grade separation the lanes are all one-way.

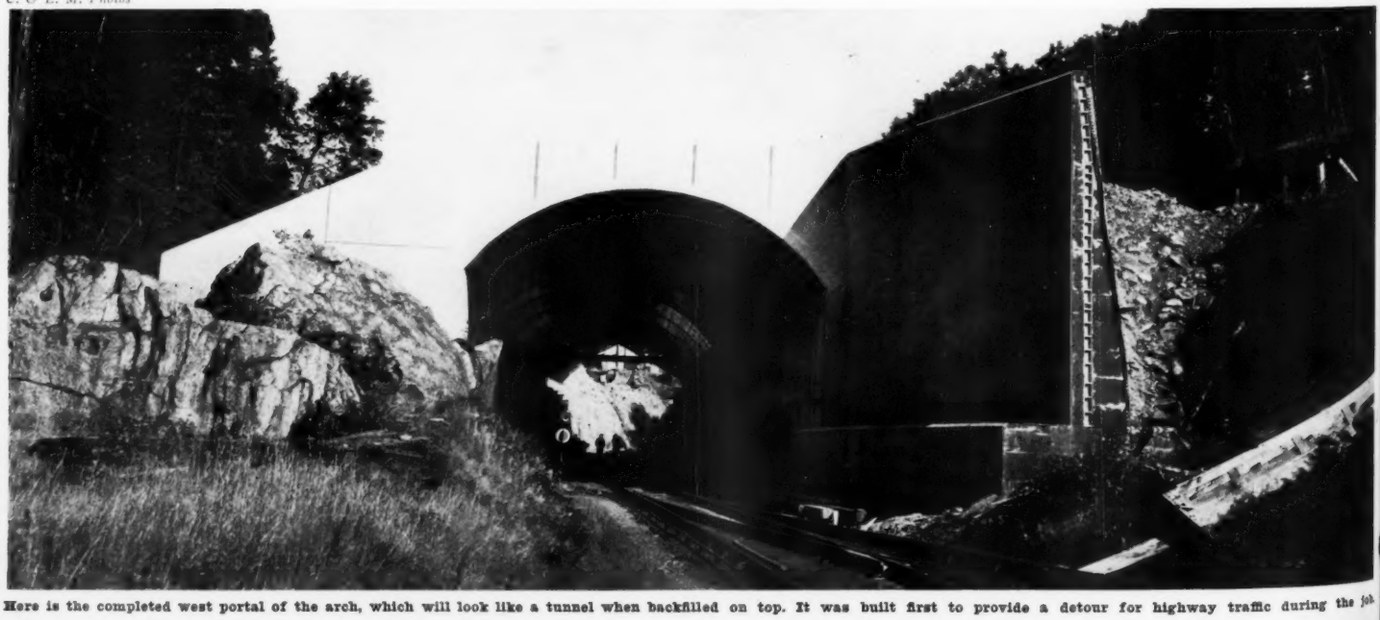
The original bridge at the site, carrying the Federal highway routes over the railroad, was built back in 1917. Designed for H-28 loading, this reinforced-concrete arch had a skew span of 94 feet and a 23-foot roadway between curbs, a width much too narrow for the amount of traffic carried on this road. An old wooden bridge also crosses the gorge and railroad track, carrying a town road that runs from the highway intersection south to Bolton. This span did not interfere with the relocation and was left undisturbed.

Both new structures are designed for H-20-S16-44 loading. The grade-separation bridge, with three simple spans of 36-48-36 feet, carries a 32-foot roadway on its 7-inch RC deck slab which is supported on seven I-beam stringers. Special shear connectors are welded to the top flange of the stringers as part of the composite design.

The RC railroad arch, which in the completed stage is more of a tunnel, is 400 feet long, being built in sixteen 25-foot sections. It conforms to the compound curve of the track which has a maximum curvature of 4 degrees 16 minutes as it winds through the deep rock cut. The rocky walls of the gorge serve as sides for the tunnel, while the concrete arch roof is 1 foot thick at the center and 2 feet thick at the ends.

To the midpoint of arch the radius is 27 feet 5/8 inch, while the inside vertical distance from the bottom to the top of arch is 10 feet 3 inches. At the bottom of the arch the tunnel is about 40 feet wide, but narrower at track level because of the slope on the rock sidewalls. Minimum vertical clearance is 26 feet 3 inches at the east end, while at the west end, which is lower,

C. & E. M. Photos



Here is the completed west portal of the arch, which will look like a tunnel when backfilled on top. It was built first to provide a detour for highway traffic during the job.

C. & E. M. Photo

Ferdinand L. Arrigoni, left, supervised the Connecticut road relocation. Stanley Amidon was Resident Engineer.

the clearance is 4 feet greater, or 30 feet 3 inches.

Two-Stage Construction

In brief, the relocation resolved itself into a two-stage construction operation. The first stage involved providing a detour for highway traffic, and to do this it was necessary first to build a portion of the tunnel at the west end and place backfill over it. Then in the second stage, the original bridge that had been carrying the highway over the railroad was demolished, and the two new structures were completed. Railroad operations, as well as highway traffic, were maintained continually at the site. Three passenger trains passed over the track daily, as did several long freights during the night.

Work started at the west end of the tunnel on the north abutment, and nine 25-foot sections were poured. Work also was performed concurrently on the south abutment where the contractor poured seven abutment sections. Rock in this area is mostly mica schist, on which the abutments are founded, and a geologic fault runs roughly north and south across the structure. Consequently, all the decomposed or loose rock had to be removed in certain areas down to rock that was suitable for foundations.

Because of this condition, nine different types of abutment sections were designed to meet the various ramifications of the rock. Even these designs were modified in the field, so that practically no two abutments were alike as to shape and size. Wall heights ranged from 5 to 27 feet, and bottom thickness varied from 6 to 21 feet. Voids that developed from the removal of the loose and disintegrated rock were filled in with concrete. In some places the excavation was carried down to 5 feet below track level along the sides of the cut.

Rock Work

The mica schist formation in this area slopes in a northwesterly direction, and the rock carries considerable moisture. Because of the railroad, the rock alongside the track was removed in lifts only 4 feet deep. Drilling equipment included an Ingersoll-Rand and a Worthington wagon drill, and six I-R Jackhamers. Air was supplied by three compressors—two I-R's at 315 cfm and a Joy 630-cfm unit—and the holes were charged with Du Pont 40 per cent dynamite.

Three cranes working along the top of the cut on the north side removed rock from the gorge. They included a Koehring 605 with a 70-foot boom; a Lima with a 50-foot boom; and a Lorain 504 truck crane with a 60-foot boom. All were equipped with Owen round-nose clamshell buckets, the Koehring rig using a ¾-yard size and the other machines using ½-yard buckets. A 38-B Bucyrus-Erie 1½-yard shovel also worked on the excavation. Material was hauled away in 8 International 5-yard, and 2 Sterling 6-yard trucks.

Forms for the concrete abutments and walls were built of ⅝-inch Plyform, backed with 2 x 6 studs on 12-inch centers and double 2 x 6 wales on 3-foot centers. For additional support in some areas, 6 x 8 vertical stiffbacks were placed on 6-foot centers. Universal ties held the panels together.

Concrete Plant

Concrete for both the structures and the pavement was mixed on the job in two Ransome pavers—a 34-E and a 27-E. Dry batches were hauled to the pavers in four International trucks from a plant that was set up on a siding of the railroad just west of the tunnel. The plant consisted of two Blaw-Knox bins—a 150-ton unit for the aggregate, and an 800-barrel cement silo. Water for the mix came from a nearby pond in tank trucks.

Stone for the coarse aggregate was delivered by rail from the York Hill Trap Rock Co. of Meriden, Conn., while sand for the fine aggregate was trucked in from the Alexander Jarvis Co. of Manchester, 4 miles away. Portland bulk cement came via rail from the Universal Atlas plant at Hudson, N. Y., and from the North American plant at Catskill, N. Y. Natural cement was also used in the mix at the rate of one bag of Rosendale natural to six bags of portland. Bethlehem Steel Co. supplied both the structural and reinforcing steel.

The pavers discharged the concrete into Blaw-Knox 1-yard buckets which were lifted to the forms by the cranes from their position at the side of the tunnel. Both Maginniss and Mall vibrators were used to vibrate the concrete as it was placed. The concrete was cured with wetted mats.

Thus in the first-stage construction, nine sections of the north and seven sections of the south abutments were poured, along with six arch sections, and the west portal. Included in this portal work was 60 feet of the southwest wing wall. The rest of the wing was poured later. This wall is 32 feet high, and extends for 240 feet along the north side of the new road.

Steel Forms for Arch

A Blaw-Knox steel form 30 feet in length was used in pouring the 25-foot sections of arch. It was easily dismantled and moved ahead for pouring the next section within two or three days after the concrete had attained sufficient strength. For the first six arch sections an extra bag of cement was put in the mix for high early strength, and the forms were stripped in a minimum of one week. This was done to speed up the construction of the temporary detour road over the west end of the tunnel. Stripping was controlled by the results of the beam breaks.

The form moved along on steel

(Concluded on next page)

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FASTER! EASIER! At Less COST!

"OFF-THE-ROAD" "ON-THE-ROAD"

General D. T. L. with deep, sharp, angled cleats and sturdy, high shoulder lugs. Designed for maximum traction on soft surfaces—forward or backward.

General H. C. T. for trucks that go off-the-road to pick-up, deliver loads. Free-rolling tread and stronger body for more miles, more safety.

THE GENERAL D.T.L.

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Make Every Worn Tire Work Longer for More Profit!

Your GENERAL TIRE DEALER will KRAFT SYSTEM RECAP Worn Tires with the New GENERAL Truck Tire Tread of Your Choice

KRAFT SYSTEM RECAPPING A GENERAL TIRE SERVICE

You're throwing away money when you throw away worn tires or accept an ordinary "adjustment" for them. Let your General Tire Dealer—a tire expert—restore worn tires with famous factory controlled Kraft System Recapping. You choose from the complete line of on and off-the-road new General Tire treads and he'll put that tread on your worn tire. He can do sectional repairs too. Get Kraft System Recapping—get more profit from every tire.

SPECIFY GENERAL TIRES ON YOUR NEW EQUIPMENT

New Tunnel-Bridge Relieves Bottleneck

(*Continued from preceding page*)

rollers set on steel plates laid on 12 x 12 timber sleepers. These horizontal runners were supported on legs made from sections of telephone poles erected at the sides of the tunnel. Steel ties anchored in the rock secured the vertical legs in place, and kept them in an upright position.

Because of the sharp curve of the arch, it was necessary to have an outside form extending halfway up the arch on each side to hold the concrete in place. This outer form butted against the shoulder of the abutment, and was supported at one end by the arch already poured, and at the other end by a bulkhead. To resist any lifting force it was tied to the inside form by steel rods. Precast-concrete blocks or posts placed between the forms supported the outer shell and maintained the required depth; they were left in the pour. The curve of the track was followed by making a break in the alignment every fourth section.

A Drainage Problem

In the past the formation of ice in the railroad cut had caused considerable trouble. To overcome that condition in the new structure, a comprehensive system of drainage was followed to handle seepage through the rocks. Behind the south wall two drainage wells made of concrete block were installed at sections where needed. They extend up through the concrete abutment and are filled with crushed stone to carry off the water to cast-iron weep holes that go through the wall near the bottom. A longitudinal underdrain near the top back corner of the abutment supplements the drainage wells.

On the north side the water problem was somewhat different, consisting of less seepage through the ledge but appearing as spring-like concentrations. A continuous underdrain behind the wall leached off the flow at selective locations. This was supplemented by a few drainage wells where required. The backs of the abutments were dampproofed with two coats of tar, and a membrane waterproofing was mopped on top of the arch barrel. The latter was followed with a 2-inch reinforced mortar protective coating. As the first step in the backfilling, a blanket of pervious material was laid over the arch. Water from any hidden springs is thus percolated off into the wells and underdrain system where it can cause no damage to the structure or track.

After the west end of the tunnel was completed and traffic detoured over it, the contractor removed the old bridge. This was followed by the construction of the highway grade-separation bridge, grading, paving, and completion of the tunnel and the east portal with a 75-foot wing wall at the northeast end.

Quantities and Personnel

Major items in the highway relocation and grade-separation project at Bolton Notch included the following quantities:

Earth excavation	43,900 cu. yds.
Rock excavation	44,847 cu. yds.
Bridge excavation	4,428 cu. yds.
Borrow	32,080 cu. yds.
Portland cement	14,504 bbl.
Natural cement	1,088 bbl.
Class A concrete	4,292 cu. yds.
Deformed steel bars	355,801 lbs.
Structural steel	101,800 lbs.
Concrete pavement	4,716 cu. yds.
Mat reinforcement	21,223 sq. yds.
Subbase	16,900 cu. yds.

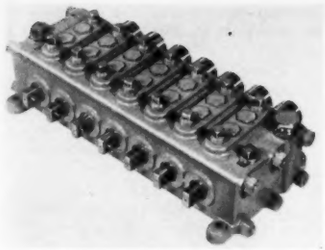
Gravel for the subbase under the concrete pavement and for the shoulders was obtained from a pit 2 miles from the job site.

D. Arrigoni, general contractor, employed an average force of 30 on the project under the general supervision of Ferdinand L. Arrigoni, a member of the firm.

For the Connecticut State Highway Department, Stanley C. Amidon was Resident Engineer. The job was located in District 1 of which E. B. Burdick is District Engineer and M. B. Pearce is District Construction Engineer. The Department is headed by G. Albert Hill, Commissioner. M. A. Tyack is Construction Engineer, and J. F. Willis is Engineer of Bridges and Structures.

Multiple Stack Valve

A ¾-inch multiple-section stack valve for mobile equipment has been developed by the Hydraulic Division of Sundstrand Machine Tool Co., 2531 Eleventh St., Rockford, Ill. The S-25 permits any number of devices to be actuated simultaneously under full or varying load, provided the total load does not exceed the relief-valve setting. Thus on a grader, for example, it is possible to lift both ends of the blade simultaneously. This permits continuous rather than intermittent operation.



Sundstrand developed this ¾-inch multiple stack valve for series operation of mobile equipment.

From the standpoint of the operator, the inclusion of a check valve in the body of each section is a guarantee of greater safety. Loads cannot be dropped or shifted as their direction is changed, since positive cylinder movement is always maintained and no momentary reversal of the cylinder is possible as the stem is shifted.

The new valve incorporates pressure sealing by using O-Ring seals between sections. This is said to assure leakproof construction, but permits sections to be added at a later date. As each section is an individual standard unit, a valve assembly or stack may be tailored to exact requirements with various inlet, 4-way, 3-way, and outlet sections.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 788.

Bulletin on Classifiers

A new bulletin on drag-type classifiers for sand production in gravel, quarry, and washing-plant operations has been issued by Pioneer Engineering Works, Inc., 1515 Central Ave., Minneapolis 13, Minn. It explains the operation of the classifier and includes a cutaway drawing showing construction features. Complete specifications and capacities are listed.

This literature may be obtained from the company, or by using the Request Card at page 18. Circle No. 850.

Top hauling efficiency with Dumptor means increased shovel output. For ad savings on excavating, check Model heavy-duty sizes, ¾ to 3½-yd. capacities, 7½ to 79½ tons lift lites. Model below 14½ tons

A TON OF DUMPTOR STRENGTH..

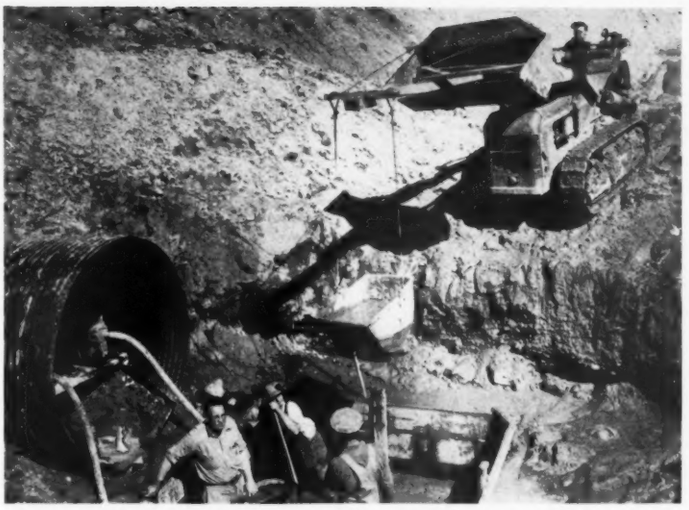
FAST, EASY SPOTTING . . . In confined underground operation, Dumptors spot fast, close to shovel . . . no need to turn. Big flared 8′ x 8′ body permits loading over end or sides. Shovel operator has easy-to-hit target, less spillage, short swing.

NO-TURN SHUTTLE HAUL . . . Dumptors travel same speed forward and reverse . . . save slow jockeying back and forth at the loading unit, at the dump. Yet, Dumptors have plenty of maneuverability . . . turn in a tight circle of 19′-6″ radius.

Inventive Contractor

The accompanying picture shows a home-made boom and bucket being used with an International TD-6 tractor and Bucyrus-Erie front-end loader to remove quicksand from an excavation. The rig was the brainchild of contractor Wieseke & Smith, Marshall, Minn. It was improvised on the spur of the moment to remove quicksand from an excavation for a dam-intake tower footing at Brauner Lake Dam, near Russell, Minn.

The contractor's men nailed a cross-arm with braces to an 8-foot 4 x 6, placed the cross-arm in the loader bucket, and trussed it up by looping an old mixer cable around the other end of the boom and the top of the bucket. Another cable supported a ¼-yard concrete-buggy bucket from the end of the boom. With this arrangement they lowered the buggy bucket into the excavation, filled it by hand, raised it with the tractor, swung it to the side, and dumped it by tipping the bucket.



Wieseke & Smith improvised this boom and bucket to bail quicksand out of an excavation for Brauner Lake Dam near Russell, Minn.

As this rig was not bolted to the loader bucket, all the operator had to do to disconnect the whole thing was to rest the end of the boom on the ground and dump the loader bucket.

Plaster Column Cover Passes New Fire Test

Final tests in a recently completed series showed that a 1⅜-inch coating of lightweight perlite-gypsum plaster on self-furring metal lath is sufficient to provide 3½-hour fire protection for steel columns, announces the Perlite Institute, 35 W. 53rd St., New York 19, N. Y. In previous tests using the same basic construction, a one-inch thickness of perlite-gypsum plaster received a 2-hour fire-retardant rating, while a 1¾-inch thickness was given a 4-hour rating, the maximum required by any building code in the United States.

A trowel and a pair of nippers are the only tools required to install this protection. Self-furring diamond-mesh metal lath with ¼-inch indentations is wrapped around the column, corner beads are attached, and perlite-gypsum plaster is applied to the thickness required to obtain the necessary fire rating: 1 inch for a 2-hour rating, 1⅜ inches for 3 hours, and 1¾ inches for 4 hours.

A standard mix of 2 cubic feet of perlite plaster aggregate to 100 pounds of fibered gypsum plaster is used for the scratch coat, while the second or brown coat is made up of 3 cubic feet of perlite to 100 pounds of gypsum plaster. Because perlite is light, the total thickness of the brown coat can be applied in one operation without the wet plaster rolling or sagging. A standard white finish is applied after the brown coat has set.

An alternate construction was also tested. It used diamond-mesh metal lath over ¾-inch cold-rolled furring channels at approximately 2-foot vertical spacings. When covered with 1½ inches of perlite-gypsum plaster, this construction received a 4-hour rating, indicating that channel furring is equivalent to self-furring in terms of fire resistance if not of cost.

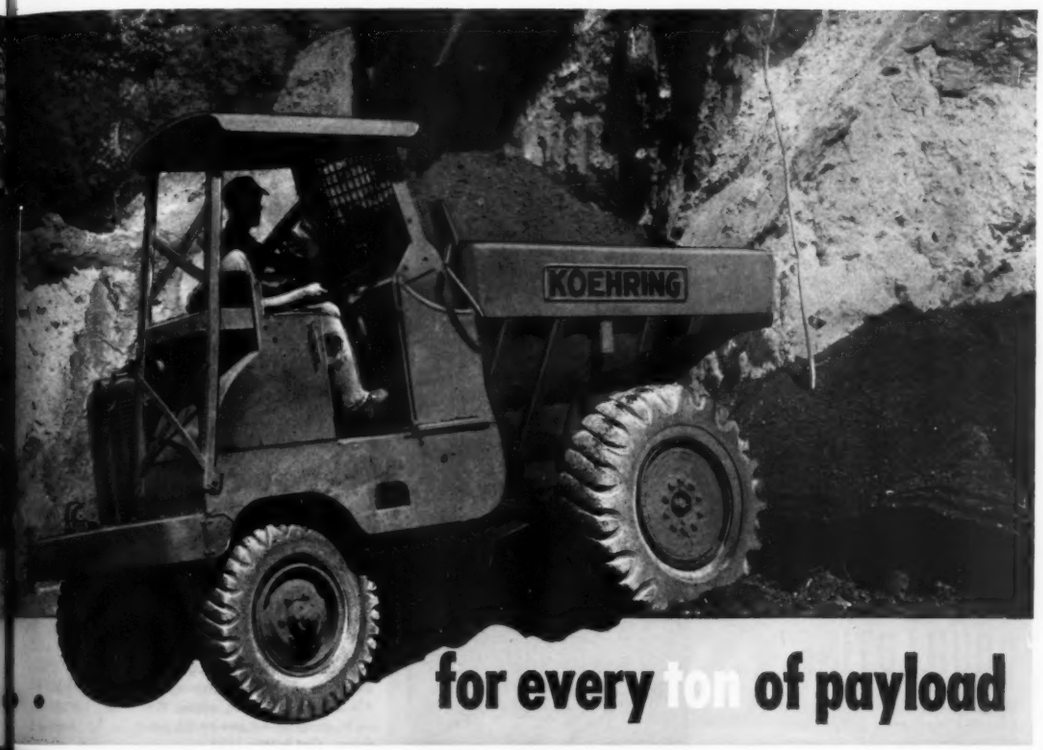
The sponsors claim that these new constructions have only one-seventh the weight of equivalent concrete or masonry fire protections, and therefore put less load on the structure, allowing important savings in structural-steel supporting members. In addition, they save space and dollars because they not only fireproof but provide a finished plaster job ready for painting or papering.

The fireproofing action of thin coats of perlite-gypsum plaster is due to the insulating properties of low-density granules of expanded perlite aggregate. Perlite is a volcanic glass rock mined in the western United States. When crushed and heated in direct-flame furnaces to temperatures above 1,500 degrees F, it "pops" or expands to form lightweight, noncombustible, glass-like particles about one-tenth the weight of sand or gravel.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 789.

Allis-Chalmers Promotions

R. S. Stevenson, former Vice President in Charge of the Tractor Division, has been elected Executive Vice President of Allis-Chalmers Mfg. Co., Milwaukee, Wis. Starting as a salesman with the Kansas City branch, he has been with the company since 1933. Succeeding Mr. Stevenson is Willis G. Scholl, former Vice President and General Sales Manager of the Tractor Division; and Frank Mussel, Eastern Territory Manager of the Division, takes over Mr. Scholl's position. Both men joined the company in 1936.



. . . for every ton of payload

To stand up under the most severe loading shocks of mine, quarry and construction service, Koehring Dumptors have more than a ton of net vehicle weight for every ton of payload. Sides, end and bottom of all-welded 6-yard body are heavily reinforced with 4" channel ribs. More than triple strength built into the bottom cushions shocks of rock loading. Seasoned 1⅝" oak timbers are securely bolted between two layers of 5/16" steel plate. Free-swinging kick-out pan adds another tough 3/16" high-manganese steel plate to Dumptor bottom for extra protection.

To withstand punishment of rough, off-road hauling, there's plenty of strength, too, in the heavy-duty chassis. Dumptor has rugged main frame of 8" ship channels, heavily trussed . . . 1-piece steel drive-axle housing and transmission case . . . 4" chrome steel drive axles . . . cast alloy steel "I" beam steering axle. There are no leaf springs . . . just one big, double-coil chassis spring on steering axle . . . none on drive axle. Big, shock-absorbing drive tires eliminate need for more. That means no spring maintenance.

For fast acceleration, less shifting, more gradeability, Dumptors also have 6 HP for every ton of gross weight . . . climb grades up to 24% fully loaded. Learn, too, how 1-second gravity dump eliminates body hoist maintenance . . . saves 15 to 25 seconds on every cycle with Dumptors. Get all the facts from your Koehring distributor.

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Milwaukee 16, Wis. K128

KOEHRING DUMPTOR

SUBSIDIARIES: PARSONS • KWIK-MIX • JOHNSON

Rotary Masonry Drills

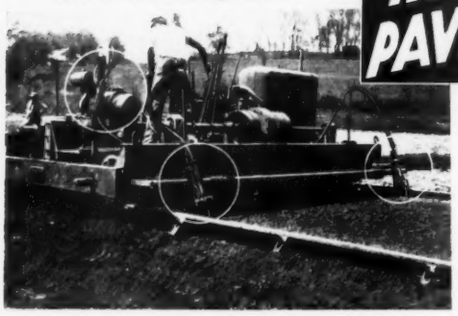
A catalog covering its complete line of rotary masonry drills is available from Termite Drills, Inc., 99 N. Lotus Ave., Pasadena 8, Calif. It describes both the core and concrete drills, and lists size and price data.

The drills have a continuous spiral worm which starts at the grinding inserts. This carries the material away right after it is pulverized. Concrete Termites are made for drilling holes ¼ to 11/16 inch in diameter, and Core Termites for ¾-inch holes and larger.

This literature may be obtained from the company, or by using the Request Card at page 18. Circle No. 743.

Maginniss HI-LECTRIC CONCRETE VIBRATORS ON THE JOB—

VIBRATING HIGHWAY PAVEMENTS



NO FLEXIBLE SHAFTS

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ELECTRIC MOTOR IN HEAD

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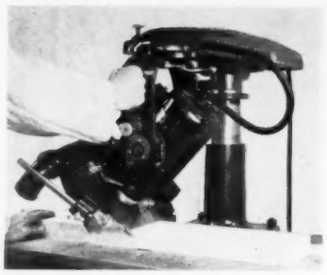
REMOTELY CONTROLLED BY OPERATOR

With a Maginniss HI-LECTRIC Vibrator, concrete placing in any type of form is faster, cheaper, effortless, with a better looking job when the forms are removed.

Maginniss POWER TOOL CO.
MANSFIELD, OHIO



Motor-case interference has been minimized in the DeWalt R-2 receding-arm saw. Accordingly, depth of cut is 4½ inches with a 14-inch blade.

A Receding-Arm Saw

Production of a new receding-arm saw with direct-drive motor is announced by DeWalt, Inc., Lancaster, Pa. The unit is designed for a minimum of motor-case interference, permitting a depth of cut to 4½ inches with a 14-inch blade. This is achieved by squaring the bottom of the motor case, thus adding inches to the effective blade diameter. The low-dead-rise motor also adds depth to the cut. It is standard equipment on other DeWalt radial-arm saws, but is new to the Model R-2.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 794.

Data on Plastic Waterstop

A new chart and folder on waterstops for concrete construction are available from Water Seals, Inc., 9 S. Clinton St., Chicago, Ill. They illustrate several job applications of the new 4-rig Harza Labyrinth.

The waterstop is made of flexible polyvinyl plastic. It comes in 100-foot lengths and can be cut in the field with a pocket knife. Separate sections can be joined with a hot knife or an ordinary torch.

This literature may be obtained from the company, or by using the Request Card at page 18. Circle No. 767.

ON-THE-JOB CUTTING OF REINFORCING ROD Made Easy!

Model 20-A Integral Hand Pump

PORTABLE, HYDRAULIC

CUTS ¾" REINFORCING ROD

CUTS 1" LOG CHAIN

WEIGHS ONLY 45 LBS.

NEW MANCO "GUILLOTINE"

Big-capacity, self-contained portable hydraulic cutter with "C" frame open anvil. Also cuts chain and steel rod, as well as square and hex-shaped material. Other models to cut wire rope, cable.

Easy hydraulic hand pump action (similar to bicycle pump). Operator uses his weight, not his strength, to make cut. Positive automatic blade retraction.

Latest type oil seals positively prevent leakage at both maximum pressure and no pressure. Safety-relief valve prevents overloading.

AVAILABLE WITH COMPRESSED AIR PUMP 200 CUTS PER HOUR

Press pedal for automatic cutting. Air hydraulic pump assembly operates off any source of compressed air supplying 100 lbs. pressure. Uses 16 cubic feet per minute.

Model 20-D Compressed Air Hydraulic Pump

REPRESENTATIVES
Several good territories available on Manco Guillotine line. Please give complete statement of qualifications when writing.

SEND COUPON For Complete Information and Prices

MANCO MFG. CO.
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Gentlemen:
Please send me complete information and prices on The Manco Guillotine.

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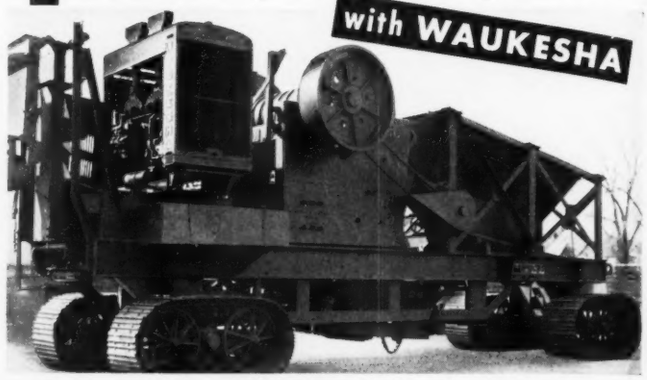
Pioneer packs in power with WAUKESHA

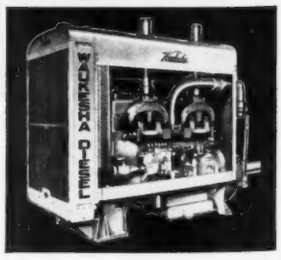


for U.S. ARMY rock plants

Gasoline

WAUKESHA Super-Duty Six Gasoline Unit (6-WAKU)— 6-cyl., 6¼-in. bore x 6½-in. stroke, 1197 cu. in. displacement powers the plant shown. Get Bulletin 1555.

WAUKESHA Diesel



WAUKESHA Super-Duty Six DIESEL Unit (6-WAKDU)— 6-cyl., 6¼-in. bore x 6½-in. stroke, 1197 cu. in. displacement. Get Bulletin 1418.

The U. S. ARMY uses portable rock crushing, screening, and washing plants to produce aggregate for air bases, roads, and concrete structures. Shown is a 56-A Primary Crushing Unit, typical of these plants, which Pioneer Engineering Works of Minneapolis, Minnesota, build to U. S. Army Engineers' Specifications with a Waukesha Super-Duty Six Power Unit to drive the crusher, feeders and conveyor. Capacity is 300 to 400 tons per hour with crusher set at 6-inch discharge.

Waukesha Super-Duty Sixes . . . gasoline or Diesel . . . are the choice of power equipment makers, operators and owners alike —for lively acceleration, shock-free operation, and low upkeep with high fuel economy.

187

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS.
NEW YORK • TULSA • LOS ANGELES

New Concrete Paving For High River Bridge

Form Stripping for Chain of Rocks Bridge Deck Speeded By Special Rolling Under-Bridge Scaffold

By L. H. HOUCK

• A SCAFFOLD for use in under-bridge form stripping, which hangs from the bridge and runs on rollers on the bottom flanges of the three longitudinal I-beam girders, is a highly interesting job-developed feature of the resurfacing of the Chain of Rocks toll bridge over the Mississippi River above St. Louis.

Since the bridge is more than 80 feet above the surface of the water, scaffolding was a major problem that could have developed into a high-cost detail. The movable scaffold is suspended by twelve hangers. These are equipped with rollers hung from the upper side of the bottom flange of the I-beams. The framework is solidly floored with 2-inch plank and is low enough so that workmen can swing over the side of the bridge and under. From this platform the concrete forms—consisting of 2x6 framing covered with plywood—are removed from under the bridge. As each poured section is cured, the movable scaffold may be run up for removal of the re-usable forms. The end result is that the under surface of the new roadway of the bridge is just as smooth as the top.

The Robinson Construction Co., St. Louis, Mo., has the contract for removing the old concrete deck and replacing it with new reinforced concrete and new curb. The job was started in March, 1952, and plans for finishing this year are bright.

Bridge History

The Chain of Rocks Bridge is a toll bridge located near the famed Chain of Rocks of the Mississippi above St. Louis, where the St. Louis water system's pumping station is also located. It is owned by the city of Madison, Ill., and was first opened to traffic in 1929. It carries heavy traffic of U. S. 66 and U. S. 40 by-passes. Traffic count is more than 6,000 vehicles daily and a feature of the contract was that the bridge be kept open for traffic during the resurfacing.

The bridge was designed by Shortridge Hardesty, Consulting Engineer, New York, N. Y., and he was also Consulting Engineer for the resurfacing.

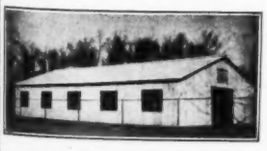
The old concrete was considerably fatigued, and as the loads increased the past few years the old surface became more worn. The bridge owners found constant repairing a burdensome expense. The old surface had been given a 1-inch coating of asphalt some years ago and the manhole covers and scupper drains had been raised 1 inch. They had to be lowered 1 inch for the grade of the new surface.

The south side of the bridge carries telephone and television cables of the

(Continued on next page)

Lots of men work in a small space on the Chain Rocks Bridge. Speed is essential in unloading concrete since the stopped traffic must be released as quickly as possible. The truck goes on through the way it is headed.

Cooper-Built
STEEL or ALUMINUM BUILDINGS for all purposes



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233 2nd Street Hackensack, N. J.

3 BIG REASONS why the LULL Shoveloader

OUT-VALUES 'em all!

1 DOES MORE JOBS

No "one-job" machine, Lull Shoveloader does scores of jobs . . . with equal efficiency. It's quickly and easily equipped for digging, loading, dozing, snow-removing, sweeping, etc. There are no problems of seasonal idleness . . . no wasted hours of standing time!

2 DOES MORE JOBS BETTER

Shoveloader's superior performance is no mere boast—it is an established fact, solidly backed by these design features: Double-Acting Bucket Control . . . Power Down Crowd . . . Longer, Higher Reach . . . Finger-Tip Hydraulic Control—plus unobstructed visibility and improved safety for the operator. These features have been proven by State, County and Municipal Highway Departments from coast to coast. Engineered to mount on and utilize the full power of the best industrial wheel type tractors, Shoveloader in no way interferes with use of the tractor for other purposes.

3 COSTS LESS TO BUY . . . AND TO OPERATE

When you buy Shoveloader, you save two ways: (1) the total cost of Shoveloader, plus the tractor of your choice, is well below that of so-called "self-contained" units, which furnish engine and loader as a unit. You select the tractor yourself from four popular makes (Minneapolis-Moline, Case, Oliver or Sheppard, each available in several models). (2) Low as Shoveloader's first cost is, it is returned to you many times over in work performed, profits earned, and expense saved.

THIS BULLETIN gives complete data on Lull Shoveloader. Have you received your copy?

MAKE US PROVE SHOVELOADER'S GREATER VALUE! See your Lull Distributor today for an actual demonstration. Or write direct for full information.

LULL Manufacturing Company
370 W. 90th Street • Minneapolis 20, Minn.

New Concrete Paving For High River Bridge

(*Continued from preceding page*)

American Telephone & Telegraph Co. These had to be protected, so shelters were erected for the cable manholes and other exposed portions.

The surface being replaced is 5,346 feet long and 21 feet 4 inches wide.

Warning and Flagging

Barricading, warning, and traffic handling posed considerably more of a problem on this high structure than on most similar types of construction jobs.

Only half a width of roadway could be worked at a time, so as to leave half for two-way flagged traffic. This traffic had to be controlled to allow ingress and egress into the single section at each end. Had two cars ever been allowed to meet bumper to bumper in this section, one end of the traffic would have had to start backing up around Collinsville, Ill., and the other end somewhere between St. Louis and Kansas City. This nightmare hasn't happened yet.

Movable barricades were made and erected on the center line of the bridge. These were about 5 feet high in order to block the view of drivers and passengers. The reason for this was that part of the work was carried on over an open section of the bridge with the Mississippi clearly in view below, and it was thought this might frighten some drivers or at least make them nervous. Another consideration was that drivers might become so curious and interested in watching the work that they would become involved in an accident. It was soon proved, however, that the barricades should be lower, and they were then reduced to about 2½ feet high so that workmen could watch the traffic and the drivers of passing cars would have a better angle of view.

The barricade panels are 15 feet long and are moved down the center line as the work progresses.

Flagging proved a troublesome job that needed constant attention. This required the services of 6 men on a 3-shift basis. Since one end was out of sight of the other, some means of communication was necessary. As 2-way radio was thought to be the ideal system, it was installed. Electric-flasher warning signals were set up to slow down the traffic for entrance into the controlled zone. But it was soon discovered that the electric flashers, electrically powered concrete vibrators and other equipment, and passing autos created a serious disturbance on the radio waves so that flagmen had difficulty in making themselves understood correctly. The solution to the problem was ordinary telephones, so the radio was taken out and telephones substituted. These worked out satisfactorily.

Removal of Old Deck

With barricade and flag-control problems solved, the contractor was ready to work out a system for removing the old concrete slab.

Disposal of the material, or how to pick it up after it was jackhammered from the double mat of steel reinforcing, was a problem. After numerous conferences with the Corps of Engineers, the contractor was given permission to drop the broken concrete into the river, provided proper precautions were taken in regard to boat traffic and the sizes were kept to small diameters.

With that worked out, the demolition crew was set to work. It consisted of six workmen with Gardner-Denver and Thor jackhammers powered by air from a 315-cfm Jaeger air compressor.

Steel and Forming

When the old deck was stripped to longitudinal girders and transverse steel members, the forms for the bottom of the slab were built.

This man is busy demolishing the old deck with an air hammer. A Jaeger 315-cfm air compressor is in the background. Notice the low barricades which are wedged in the center line and move as the job progresses.

The new steel reinforcing was fabricated in two mats about 3 inches apart with a 6-inch mesh. Steel was supplied by the Laclede Steel Co., St. Louis, and consisted of ½ and ⅜-inch sizes. In addition, a new centerline I-beam was welded under the center of the deck—an 8-inch member.

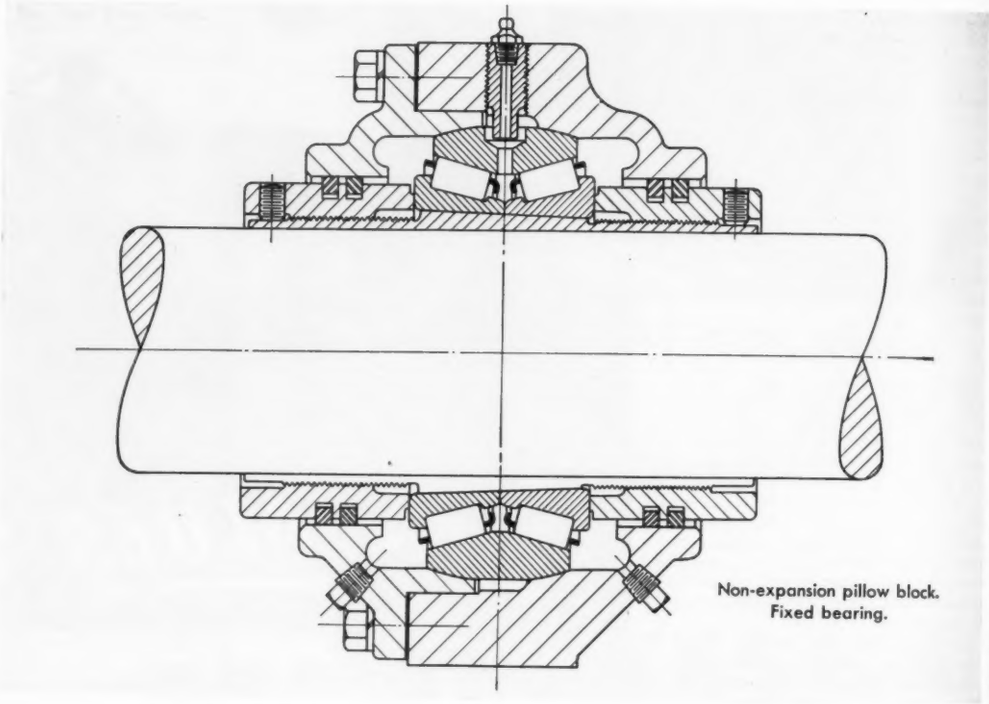
Included in the job was the business of providing the steel for widening a curve within the main overhead bridge, which was a shop-fabricated section. The section was of welded fabrication, and Lincoln welding machines were used in the shop. The section was designed for bolting and riveting to the existing members of the bridge. Steel reinforcing in the concrete figured 106 pounds per foot or a total of about 285 tons.

Concrete

Contrary to the frequent practice when old bridges are retreaded, there was no need or desire to decrease the weight by using lightweight concrete. In fact, tests revealed that the structure would be benefited by stiffening with the new load.

The new deck is 6 inches thick, 21 feet 4 inches wide, and 5,346 feet long. Concrete used is a rich mix running 6½ sacks to the yard. It was delivered

NEW TIMKEN® ROLLER



Non-expansion pillow block. Fixed bearing.

First application of new tapered makes new Dodge-Timken®

IT takes up less space. It weighs less. Yet the new Dodge-Timken® All-Steel pillow block has tremendous load-carrying capacity.

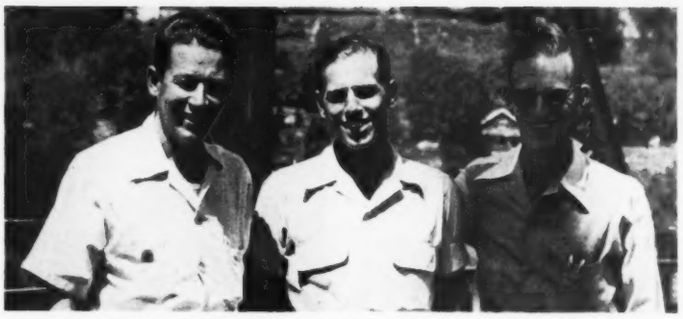
It's the result of the combined achievements of the Dodge Manufacturing Corporation, Mishawaka, Ind., and The Timken Roller Bearing Company and makes use of an entirely new Timken bearing. Never before has a self-aligning, non-adjustable tapered roller bearing with tapered bore been used in pillow blocks.

Being of all-steel construction, this new Dodge-Timken pillow block is more compact and fills a real need where space is a factor. It is available in both expansion and non-expansion designs. And it incorporates all the advantages of Timken tapered roller bearings.

to the job in transit mixers and was supplied by the Majestic Building Materials Corp., St. Louis. The pour rate when the job was visited in late July was 550 feet on half the bridge per week.

Even the job of emptying the transit mixers became a problem in the narrow traffic way, with the necessity for maintaining traffic. It was first decided to back the mixers up in the work lane and provide a runway, then dump the mixers into push buggies which would be pushed over a board platform to the point of pour. This was discovered to be a slow process, so the method was changed. The most successful plan was to let the transit mixer dump from the side while in the traffic lane. This meant getting the transit truck loaded and into the traffic of the traffic lane at the right time and then stopping the traffic while the pour was made.

Flagmen were alerted and traffic moved ahead at the normal pace until the transit-mixer truck in the line of traffic reached the flagman at the entrance of the lane. When the oncoming traffic had cleared and he had the go-ahead, he permitted all to move out except the vehicle behind the mixer which he held. The mixer moved on up to pour position, poured its load and moved on out. The outgoing flagman then gave the other man the all-clear, and traffic resumed. This procedure was accomplished quicker than it takes to tell it; the workmen rushing to work the concrete had more room to move about; and the traffic was held up on an average of about 5 minutes. Thus it speeded up the pours as well as decreased the handling time and cost.



On the Chain of Rocks toll-bridge job (left to right): A. R. Miller, General Superintendent for Robinson Construction Co., St. Louis; Joseph B. Brooks, Project Engineer, St. Louis, and A. Becker, Office Manager for Robinson.

Push buggies are now used only when the new concrete curbs are poured.

Concrete was vibrated with Jackson electric vibrators and topped off with a Jackson electric vibratory screed. The surface was given a broom finish, and cured with a membrane compound.

Safety

Rated as a "high-in-the-air job", this work has been remarkably free from accidents. Only one workman has been injured so far. A labor foreman slipped through and fell 30 feet beneath the bridge to earth instead of water and was seriously injured, but will recover. There have been several slight auto mishaps in the traffic, but none of them were serious and none involved personal injuries.

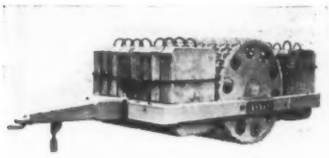
However, the mortality rate on tools, particularly hand tools, is exceptionally high. When you drop your hammer or saw into the Mississippi, the chances for recovery are remote.

Personnel

A. R. Miller, Jr., is General Superintendent for the Robinson Construction Co., and A. Becker is Office Manager for the job. The contractor has a materials yard and office just off the eastern approach to the bridge. Joseph B. Brooks, St. Louis, is Resident Engineer, and Robert Bigley is Field Engineer.

Grid Roller Salvages Bituminous Pavements

A roller unit for salvaging bituminous roads by a three-way action is made by Hyster Co., 2902 N. E. Clackamas St., Portland 8, Oreg. The grid roller disintegrates the old mat material, compacts the base, and rolls the new surface.



Two methods of counterweighting are available to increase its adaptability. The grid roller may be counterweighted with reinforced-concrete T-shaped weights weighing about 1,125 pounds each, shaped to fit in slots in the frame which will hold up to 16 pieces. By changing the number of concrete sections the total weight can be varied according to the requirements of the particular operation. Available as optional equipment is a set of counterweight boxes with total capacity of about 16,550 pounds of scrap metal. The grid roller so equipped has an approximate gross weight of 30,000 pounds.

Other features of the new grid roller include grids that are solidly welded to the wheel side plates. The hardness of the grids has been increased to about 340 Brinell to give them the best combination of wear resistance and toughness.

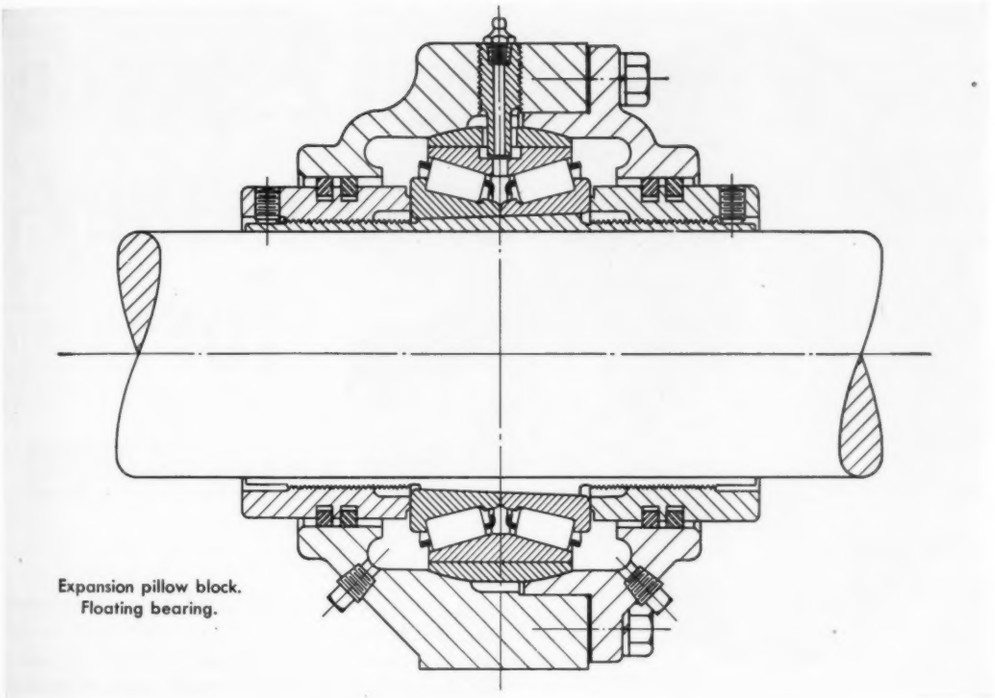
The wheels are on two independent shafts, so as to allow the two wheel sections to be serviced separately. They have large openings in the wheel plates at the rim to allow material that has worked its way through the grid opening to fall out. No cleaners are needed.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 740.

Tool Mfr. Changes Name

Skil Corp. is the new name of Skilsaw, Inc., Chicago, manufacturer of portable and electric pneumatic tools. Skil Corp. outgrew its former name of Skilsaw by expanding its product line from one portable electric saw to over 150 different tools.

BEARING PILLOW BLOCK



Expansion pillow block. Floating bearing.

bore TIMKEN® bearing pillow block more compact

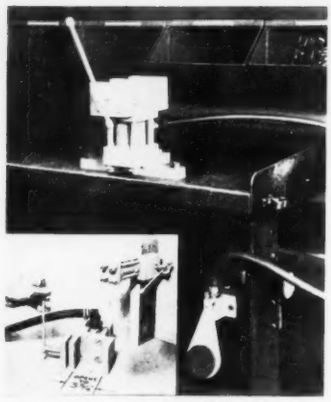
Because of their tapered construction, Timken bearings take radial and thrust loads in any combination. Line contact between rollers and races gives Timken bearings load-carrying capacity to spare. Timken bearings are made of the finest steel ever developed for tapered roller bearings—Timken fine alloy steel—and under normal conditions will last the life of the machinery with which the pillow blocks are used.

When you install new Dodge-Timken pillow blocks, you can expect dependable performance because the bearings are the best. No other bearing can give you all the advantages you get with Timken bearings. Specify them for all your other machinery, too. Look for the trade-mark "Timken" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

TIMKEN BEARING EQUIPPED *This symbol on a product means its bearings are the best.*

TIMKEN
TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL AND THRUST ⊣⊢ LOADS OR ANY COMBINATION



A face plate and some bolts serve to install the Cleveland redesigned VG air vibrator on benches.

Vise-Grip Vibrator

An air vibrator for use on bench applications has been developed by Cleveland Vibrator Co., 2828 Clinton Ave., Cleveland, Ohio. The Type VG is installed on a bench with a simple face plate and bolts. A steel U-shaped head functions as a vise to clamp the form or device to be vibrated.

A serrated steel plate is incorporated in the head to assure positive bite and rigid mounting. Area of the vise jaw is 7½ square inches. It is 8½ inches in over-all length, 5⅛ inches wide, and 3 inches high. The model with a 1¼-inch piston diameter weighs 11 pounds and the 2-inch piston diameter weighs 21 pounds.

The VG is operated with a Cleveland Type J knee valve. All brass and precision-machined, this valve is equipped with a quick-change Neoprene seat and can be hit very hard since its lever is covered with a sponge-rubber pad.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 707.

Folder Covers Backhoe

A new folder covering the ⅜-yard truck-mounted Bantam backhoe has been issued by Schield Bantam Co., Waverly, Iowa. It includes detailed engineering information on mechanical features. A large easily read chart shows dimensions and operating data. With a maximum working depth of 14 feet, the hoe is said to dig up to 100 feet of 5-foot trench per hour.

The folder also includes specifications on the company's interchangeable 2½-ton crane adaptor and two types of backfill blades for unloading, trenching, placement, and backfill.

This literature may be obtained from the company by requesting Form TT-101, or by using the Request Card at page 18. Circle No. 718.

Vermiculite Appointments

L. A. Barron, engineer for the Vermiculite Institute, Chicago, Ill., since 1949, has been named Manager of the Institute's new Technical Service Department. The department was created to do liaison work between the vermiculite industry and allied fields, as well as with governmental agencies and departments.

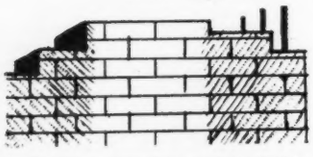
James Spence will assume Mr. Barron's former duties. He will concentrate on building codes and represent the Institute on some ASTM committees, taking care of inquiries and general work.

When the job calls for hauling heavy jagged rock like this, Jones & Laughlin Steel Corp., Pittsburgh, Pa., recommends its tough Jalloy plate for the truck floor; 10-gage Otiscoloy high-strength steel for the sides, ends, and cab shield; and rolled Otiscoloy channels for longitudinals and cross members. Circle No. 790 (Card at page 18).

keeps walls dry

CRYSTAL

invisible silicone masonry water repellent



Silicones are unequalled in proven, on-the-job, long lived, low cost performance. Wurdack Chemical Co. holds U. S. Patent #2,574,168 covering the application of silicones as a masonry water repellent. Only silicone products, whose use is licensed under that patent, may be applied to masonry structures without patent infringement.

Contractors, waterproofers and property owners should protect themselves by insisting on CRYSTAL. Users of CRYSTAL are automatically licensed and protected.

Write for name of nearest distributor or applicator and literature.

*Licensed under U. S. Patent No. 2,574,168

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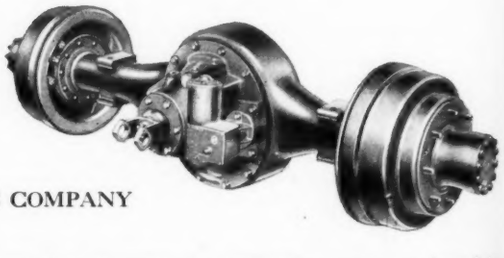
4942 Fyler Avenue
ST. LOUIS 9, MO.

The Planetary Gears in Eaton 2-speeds save money for truckers

With Eaton's exclusive planetary design, gear speeds are slower; gear loads are distributed over several gear teeth, holding down stresses and wear. Planetary pinions turn only in the low speed range. In the high speed range they are locked out. The axle then operates as a conventional single-reduction unit. Eaton 2-Speeds are quiet in operation, easy to shift, and run long, trouble-free mileages. Genuine dollars-and-cents savings for truckers are assured by actual performance records representing billions of miles of operation.

Your truck dealer will be glad to explain how Eaton 2-Speeds will enable your trucks to haul more, faster, and longer, at lower cost.

EATON 2-Speed Truck AXLES



EATON

Axle Division
EATON MANUFACTURING COMPANY
CLEVELAND, OHIO

INSIST ON ADEQUATE ROADS

Today, America's roads are crowded with twice the traffic they were designed to carry. Help end the national traffic jam by speaking up for more and better roads.

You don't need to squint any more while studying your plans, says Trans-Global Co., manufacturer of this new optical planimeter. Just look through the bi-convex magnifying lens.

Optical Planimeter

An optical planimeter which replaces the needle-point tracer with a bi-convex magnifying lens is made by Trans-Global Co., 1480 Broadway, New York 36, N. Y. The F/S 236 V eliminates squinting by allowing the operator to look through it at the magnified line to be followed. This same improvement precludes errors of parallax.

Both the counting wheel and the measuring wheel can be brought to a zero reading with a simple flick of the reset lever. Planimeters available hitherto have had to be manually spun to a zero reading. The only alternative was to note the reading at the beginning of measurement and then to subtract this value from the final reading for the correct result.

The tracer arm has graduations from 6 to 20 thousandths of a square inch per vernier unit and may be easily adjusted by using the roll button. For example, if the arm is set to 12, each vernier unit will represent .012 square inch of map area.

A Plexiglas window covers the measuring wheel and encloses it almost entirely, maintaining dust-free precision. The pole block is fixed to the drawing board with three adjustable needle-sharp anchoring pins. The polar arm which connects the pole block and the wheel carriage has a spherical joint at each end that rests in a conical seat. This arrangement assures accuracy and allows easy removal of the polar arm to rearrange for compensating positions.

A precise checking gage is included with each instrument. When used as directed, it will give an exact measurement of 10 square inches with each revolution about its fastening pin. From this precisely known area and its resultant wheel reading, the true setting of the tracer arm may be computed.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 732.

AEC Awards Contracts

The United States Atomic Energy Commission has announced the award of contracts for expansion of its gaseous-diffusion plants at Oak Ridge, Tenn., and Paducah, Ky. The 1953 Supplemental Appropriation Act signed by President Truman on July 14, 1952, appropriated a total of $2,986,894,000 for over-all AEC expansions. The contracts have been awarded as follows:

Maxon Construction Co., Dayton, Ohio, is to build a $464,000,000 addition at Oak Ridge. F. H. McGraw & Co., Hartford, Conn., has the prime contract on a $459,000,000 addition to the uranium-235 separation plant under construction at Paducah. McGraw is also contractor for the production facilities now being built at Paducah. At both the Oak Ridge and Paducah sites, a substantial part of the work will be done under fixed-price subcontracts.

Architect-engineering firms already at work planning and designing the new facilities are: Giffels & Vallet, Inc., Detroit, Mich. (design and supervision of plant construction); and Sargent & Lundy, Inc., Chicago, Ill. (design of high-voltage power-distribution systems and substation).

Both new plant additions will be operated by Carbide & Carbon Chemicals Co., a division of Union Carbide & Carbon Corp., New York, N. Y.

Adjustable Beam Clamps

Adjustable steel beam clamps for supporting temporary formwork to reinforced-concrete beams is covered in a booklet issued by Acrow, Inc., 510 N. Dearborn St., Chicago 10, Ill.

The clamps may be used for beams or casings up to 33 inches wide and up to 21 inches deep. The sides are adjusted by pins permanently attached to the unit with chains. Timber legs can be fixed on ends of horizontal arms for supporting floor formwork.

This literature may be obtained from the company, or by using the Request Card that is bound in at page 18. Circle No. 786.

handling heavy loads . . .

Torrington Spherical Roller Bearings have the tremendous load capacity needed for reliable performance in heavy-duty construction machinery.

Made from the finest materials, properly heat-treated for long, trouble-free service, these self-aligning bearings have proved themselves both in original equipment and for service requirements.

THE TORRINGTON COMPANY
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TORRINGTON SPHERICAL ROLLER BEARINGS

Spherical Roller • Tapered Roller • Straight Roller • Needle • Ball • Needle Rollers

DAVEY valves never carbon or foul!
. . . do not require cleaning!

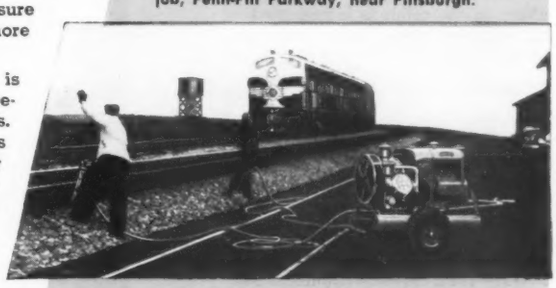
Davey Model 315 Diesel used by DeLuca Construction Co., Akron.

If you're using ordinary compressors, check your records. You'll find that air output declines as machines become older — as valves carbon. Also, that your biggest maintenance cost is for cleaning and replacement of valves.

That's why you should investigate Davey — today! Every Davey Compressor is equipped with Permanent Peak Efficiency lifetime valves. Leak-proof construction, extra large size and perfect seating of these valves, coupled with Davey's special alloy compressor heads, assure constant full volume of air . . . longer, more economical compressor life.

Davey Permanent Peak valve efficiency is the result of providing a ready path for heat removal through aluminum alloy cylinder heads. These heads transmit heat through their mass three times as fast as cast iron. Necessity for removing cylinder heads to clean carbon is eliminated. Operating tools continue to function at full capacity. A-6040

Davey Model 315 Diesel on D. Dinardo, Inc. job, Penn-Pitt Parkway, near Pittsburgh.



Davey Model 60 Super Chief on Erie Railroad right-of-way.

DAVEY pioneers of air-cooled air

DAVEY COMPRESSOR CO. • KENT, OHIO

High-Tensile Bolts Cut Erection Costs

Engineers Report Advantages of Semirigid Connections for Nearly All Types of Field Work

• STEEL erection costs can generally be reduced up to 20 per cent when connections are made with high-tensile bolts instead of rivets. Pointing out the superiority, too, of high-tensile bolts in structures subject to widely fluctuating dynamic loads, W. H. Hart told a recent A. I. S. C. District Engineers' Conference that it is now economical to replace rivets in nearly all types of field work.

The scarcity of riveters, he said, plus the fact that standard bolts, though economical in field labor, require 50 per cent more bolts than rivets, made the men working with steel look for a new method of assembling structural steel. The answer is high-tensile bolts.

Use in Semirigid Connections

The first place these bolts were used to replace rivets, said Mr. Hart, was in semirigid connections. For many years engineers had felt there was some restraint in the so-called standard beam connections that were designed for shear only, and used when the connections were considered flexible. Since 1917 research work has been carried on in riveted and bolted connections in an attempt to arrive at a design procedure which would take into account the restraint known to exist.

The first account of such procedure to come out in a form that could be used by the engineer was published in 1947 by the Committee on Steel Structure Research of the A. I. S. C. It was called "Riveted Semi-Rigid Beam to Column Building Connections". This publication gives the percentages of rigidity for standard seat-angle connections for most of the beams that are used today for both rivets and high-tensile bolts. The publication also gives the redesign coefficients, or in other words, the percentage that the simple moment can be reduced because of the restraint of the end connection. These values were obtained by tests at Lehigh University.

In nearly every case where this design method is used, there are beams that the designer would like to use, for which the values have not been given. If he encounters this condition, Mr. Hart explained, he can use a standard design for this beam, or contact the District Engineer of the A. I. S. C., who will provide the coefficient for the beams needed. When restraint in the end connection is considered, the effect on the columns is neglected, because it is the same as in any seat-angle connection.

Bolts Must Conform to Spex

High-tensile bolts have been proved by laboratory tests and field use to be economical replacements for rivets in nearly all types of field work, not only in semirigid connections. The bolts must meet the requirements of A. S. T. M. Tentative Specifications for Quenched and Tempered Steel Bolts—A325-49T. They must also conform to the American Standard Association's Standard for Regular Semifinished Hexagonal Head Bolts A. S. A. B18.2, with respect to threads and other dimensions. However, the radius of the fillet under the bolt head must be at least 1/32 inch for bolts larger than 5/8 inch diameter, and at least 3/64 inch for bolts larger than 1 inch in diameter. The design and field-erection requirements are given in a specification for "Assembly of Structural Joints Using High-Tensile Bolts", approved by the Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation in 1951.

An example of the strength provision required by these specifications is that a 3/4-inch bolt shall have a yield of 85,000 psi, a tensile strength of 120,000 psi, an elastic proof load of 28,390 pounds, and must be tightened to a tension of 90 per cent of the elastic proof load, or 25,600 pounds. It requires a torque of 320 foot-pounds to give this tension. Due to the high clamping force, it is necessary to place a hardened washer under both head and nut. These washers must meet the requirements of A. S. T. M. A325-49T. The specifications further require that a certain proportion of the bolts be checked for tension by a procedure of loosening and re-tightening under controlled conditions. The exact number of bolts is to be determined in advance by the engineer in charge, but for the present, between 5 and 10 per cent is the recommended proportion, said Mr. Hart.

Net Saving in the Beam

When a structure is designed using continuity, there is always a question whether the saving in the beams and purlins is not offset by the increase in connections. With semirigid connections, if there is a saving in the beam, it is a net saving, as standard seat-angle connections are used. This saving was brought out in two schools at Green Bay, Wis., designed by Feldhausen &

Coughlen, Architects. One structure—an addition to the Norwood School—is T-shaped with the stem 63 x 156 feet, two stories in height and the top 48 x 124 feet, one story in height. The other building is the SS Peter and Paul School. This structure is 63 x 202 feet, three stories in height. Both schools have entire structural-steel frames. The floor construction is 2½-inch concrete slab on steel bar joists and the roof construction is steel roof deck on light steel purlins.

In the SS Peter and Paul School, the total weight of beams having semirigid connections is 38 tons. Considering the same beams as simple, the total weight of beams required is 44 tons. Therefore, considering only the beams in which semirigid connections were used, there is a saving of 6 tons of steel, or 13½ per cent. In the Norwood School this saving is 11 per cent. When we consider the over-all picture on the SS Peter and Paul School, the saving is considerably smaller. The total steel required was 170 tons, exclusive of bar joists. This can be broken down as follows: Columns, 37 tons; Beams, 113 tons; and roof purlins, 20 tons. In this respect the saving is approximately 3½ per cent, but however small, it still represents a saving.

Economical Erection and Design

There has always been an erection problem with seat-angle connections, due to the rolling tolerances of the beams. The most economical shop fabrication is to weld or rivet the bottom seat angle to the column and rivet the top seat angle to the beam. When this is done, the holes for the rivets or high-tensile bolts in the top angle and column will not always line up. Shims can be placed between the beam and the bottom seat angle, or the top seat angle can be shipped loose and welded to the beam in the field. It may be necessary to use shims between the top seat angle and the beam so that holes will line up.

High-tensile bolts have proved themselves far superior to rivets in structures subject to widely fluctuating dynamic loads. The research staff of the Association of American Railroads has made several installations on ore bridges and railroad bridges throughout the country. These installations were, in many cases, in places where rivets had been loosening and giving trouble. After the high-tensile bolts had been in place for three years in some cases, they did not loosen and have given a good account of themselves. High-tensile bolts have proved to be economical in building construction as well as in bridges.

Another factor to be considered in planning any new type of construction

(*Concluded on next page*)

PERCENT MORE PRODUCTION

WITH THE MODERN SHIFT PATTERN ON ALLIS-CHALMERS HD-9 AND HD-15 TRACTORS

It takes just half the time and effort to change from low forward to fast reverse with the Allis-Chalmers HD-9 and HD-15 transmission. This shifting time saved becomes production time gained on bulldozing and other jobs calling for a short forward-backward cycle. For example, job studies prove that on backfilling, pusher work, working around large excavators, digging and loading with front-end shovels—other jobs where frequent shifts are required—you can make five passes in the time usually required to make four...actually increase production up to 25 percent.

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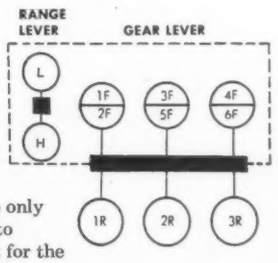

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High-Tensile Bolts Cut Erection Costs

(*Continued from preceding page*)

is the amount of work involved for the designing engineer. If it is going to cost him more to design and detail, he will not be interested in trying the new method. On the two schools at Green Bay, the architect said that very little extra time was required for designing by this method in the office. After designing the steel for SS Peter and Paul School, he stated that the time was nil, taking into consideration the overall time required for the complete design. The added advantage of this type of design made this additional time well spent. Considering the experience on the two schools, said Mr. Hart, it is safe to conclude that semirigid connections are economical. Not only do these connections show a saving to the owner, but the steel fabricator feels he has a saving in details, fabrication, and erection without additional cost to the designing engineer.

Reduction of Noise

Another field-erection advantage is the great reduction of noise. Riveting on many jobs is objectionable. In the new 21-story Mayo Clinic Diagnostic Building at Rochester, Minn., the architect made careful comparison of all types of construction, considering the fact that it was necessary to eliminate as far as possible any disturbing noise. High-tensile bolts were chosen for the job. All the noise cannot be eliminated, but the noise from air impact wrenches used in tightening the bolts is not as penetrating or long-lasting as noise from riveting. It takes from 5 to 10 seconds to tighten a bolt.

In the new 14-story Mayo Medical Center at the University of Minnesota, high-tensile bolts were again chosen because of the cost and because of elimination of noise. High-tensile bolts have also been used in a hospital at the University of Illinois. On this job they did not prove to be more economical, as the high-tensile bolts were late arriving on the job. The entire job had to be bolted with standard bolts and these replaced at a later date with the high-tensile bolts. On some of the early jobs, high-tensile bolts had to be made up on special order so the cost was high. But today the demand is such that the price is in line and a larger saving will be found on future jobs.

Bolts Versus Rivets

Mr. Hart stressed the important things to remember regarding high-tensile bolts: they can be used in place of rivets, using the same shear and bearing values as used for rivets; the bolts and washers must meet the requirements of A. S. T. M. A325-49T; and they must follow the new specification by the Research Council, being tightened to a minimum torque as given in the specification. They have been tried in both bridges and buildings and have proved economical in all cases.

In most cases the erectors are estimating that one man can put in from 150 to 200 bolts per day, and it makes very little difference if they are standard bolts or high-tensile bolts; whereas four men will drive only 200 to 250 rivets per day. To the cost of riveting must be added additional scaffolding and cost of the furnace to heat the rivets and power to drive them, which is $3.50 per hour. In most cases they estimate approximately 25 cents per bolt and 75 cents per rivet for field labor, and about the same for turned bolts as for rivets. The cost of the bolts is as follows:

High Tensile Bolts and (2) Washers	$.253 each
Rivets	.046 each
Standard Bolts	.08 each
Turned Bolts	.198 each

In most cases the connections run about 5 per cent of the tonnage for rivets and high-tensile bolts, and 6 per cent for standard bolts on light framing. This will run considerably higher on tall buildings that require heavy wind connections. On a tonnage basis most erectors are estimating $40.00 per ton for bolted work and $50.00 per ton for riveting work. Of course, these figures will vary when bidding is more competitive, and may drop to $35.00 and $45.00 per ton. Prices will also go up if it is on a high, single-bay job that requires a lot of scaffolding with few rivets or bolts to drive.

Mr. Hart quoted I. L. Baker, Field Superintendent for the Holmen Erection Company on the Mayo Diagnostic Clinic, who estimated that he saved 40 to 50 per cent in field labor using high-tensile bolts over riveting. Part of this saving will be offset by the increase in cost of bolts over rivets, which is about 20 cents per bolt. Taking into account the increase in material, the saving will be about 20 per cent. Though the cost figures given will not apply in all sections of the country, the percentage of difference should be about the same in all sections. Thus, it would not be wise to say it will cost so much to drive a rivet and so much for a high-tensile bolt. But, in most cases, the difference should be about 20 per cent, and a little higher for heavy work.

Hewitt-Robins Ups Goodyear

Austin Goodyear, General Manager of the Rubber and Conveyors Divisions of Hewitt-Robins Inc., Stamford, Conn., has been elected a Director of the company. He has been with H-R 11 years.

GULF PRODUCTS and FINE SERVICE

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on Georgia Air Base Project

Dickerson, Inc. of Monroe, N. C., and D. W. Winkelman Carolina Co., Greensboro, N. C., recently completed — well ahead of schedule—improvement of runway facilities at the Hunter Air Force Base, Savannah, Ga. Work involved 1½ million cubic yards of excavation, 180,000 tons of lime rock base, 75,000 tons of hot mix asphalt pavement, and incidental items. Mr. J. M. Nicholson, Vice President of the D.W. Winkelman Carolina Co., was in direct charge of this project.

ASK leading contractors like Dickerson, Inc. and D. W. Winkelman Carolina Co. why they use Gulf products and you will get an answer something like this: "We feel that our equipment gains an edge in performance with Gulf lubricants and fuels—their extra quality is reflected in smoother, more dependable operation, and lower maintenance costs.

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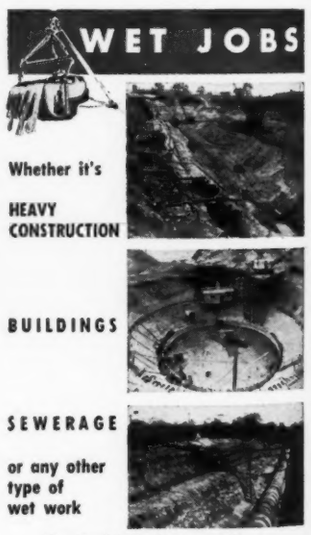

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Hammond, Ind. Houston, Tex. Jacksonville, Fla.

Core-Drilling Unit Features 8 Cutters

A new unit for drilling cored castings and through-holes, and for counterboring, has been developed by Tilden Tool Co., 209 Los Molinos, San Clemente, Calif. It is said to reduce both drilling time and costs. It has eight tungsten-carbide cutters which, according to the company, hold the precision size of a hole several hundred times as long as the three and four-fluted standard high-speed drills—even in castings with excessive sand and hard-chilled surface spots.

Another feature of the new unit is its ease in drilling a through-hole, the core

being removed by means of a patented core slot in the side of the drill body.

The core drills are made in sizes from ¾ to 4 inches in diameter and up to 36 inches in length. They can also be supplied with a plain pilot for counterboring or twist drill pilot for step drilling. A coolant feed attachment is available for drill presses and lathes.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 716.

Corps Names District Engr.

Col. H. R. Hallock has been assigned as District Engineer of the Army Corps of Engineers at Fort Worth, Texas. He has been on duty in the Fort Worth District office since 1951, and for a time was Acting District Engineer. Col. Hallock spent the four years previous to his assignment in Texas, as an instructor at the Military Academy.

Grader-Servicing Chart

A handy chart for service and maintenance of Models 118, 116, 104, 103, 102, 203, and 202 motor graders has been released by The Galion Iron Works & Mfg. Co., Galion, Ohio. It treats both the subjects of proper lubrication and adjustments. Among the parts covered are the hydraulic system, steering controls, clutch, drawbar and circle, fuel system, and brakes. Also included is a complete list of distributors where Galion parts and service are available. This literature may be obtained from the company. Or use the Request Card that is bound in at page 18. Circle No. 766.

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ARMSTRONG EQUIPMENT CO.
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ALABAMA MACH. & SUP. CO.

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ARKANSAS—North Little Rock
LEWIS-DIESEL ENGINE CO.

CALIFORNIA—Berkeley, Fort Bragg
WEST COAST ENGINE & EQUIP. CO.
Los Angeles
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Stockton
MOORE EQUIP. CO., INC.

COLORADO—Denver
COLORADO BUILDERS' SUPPLY CO. (Equip. Div.)

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Florida Diesel Engine Sales

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WESTERN MACH. & ENG. CO.

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MOUNTAIN TRACTOR COMPANY

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NEW YORK—Buffalo
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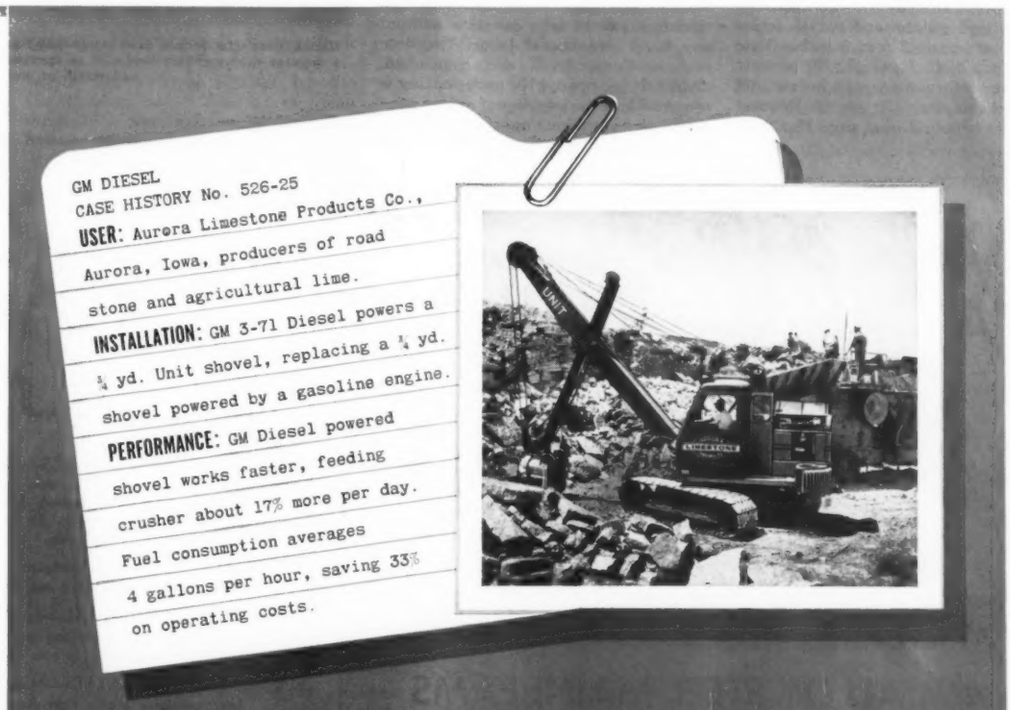
GM DIESEL
CASE HISTORY No. 526-25
USER: Aurora Limestone Products Co., Aurora, Iowa, producers of road stone and agricultural lime.
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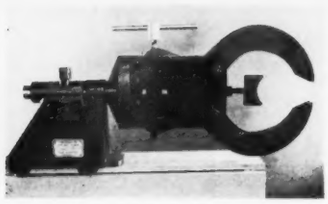

The Torquemaster No. 10 wire-rope-splicer has a capacity ranging from ¾ to 1¼ inches.

Wire-Rope Splicer

A wire-rope splicer with a capacity from ¾ to 1¼ inches is announced by Quay Industries, 100 Bar Building, Washington, D. C. The Torquemaster is said to overcome cable torque through a resistance regulator and swivel-action jaws. The unit is 2 feet 9 inches long and 1 foot high. It weighs 79 pounds.

Further information may be secured from the company. Or use the Request Card that is bound in at page 18. Circle No. 791.

Road-Widening Unit

A moldboard-frame and roller device that is easily attached to the regular motor-grader blade is announced by Ulrich Products Corp., Roanoke, Ill. The rollers guide the plow-like blade along the edge and lip of the paving. The cutting edge scours the edge of the paving as it cuts a trench to exact specifications. Depth and width of cut are adjustable to fit each job's requirements. Operation is through the grader controls, and mounting is said to require only a few minutes.

The trench is prepared in four grader passes. The first two are regular blade cuts that remove excess dirt. Then the Road Widener goes to work and, in two passes, produces a trench that is ready to take concrete without any hand cleaning or labor. The bottom is clean, level, and compacted, claims the company. No undercutting is required and the pouring of excess concrete, as in previous methods, is eliminated. No forms are needed if not called for in specifications.

Ulrich Products Corp.'s new moldboard-frame and roller device is easy to attach to a regular motor-grader blade. It is operated through the grader controls, and depth and width of cut are adjustable.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 729.

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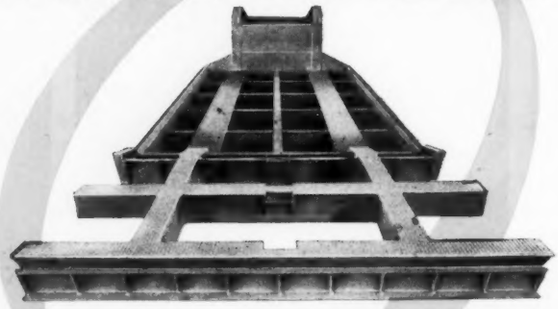

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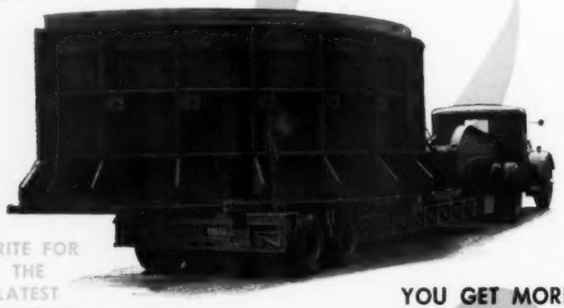

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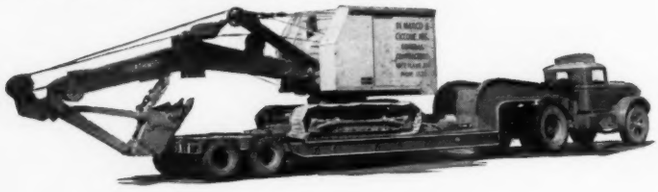

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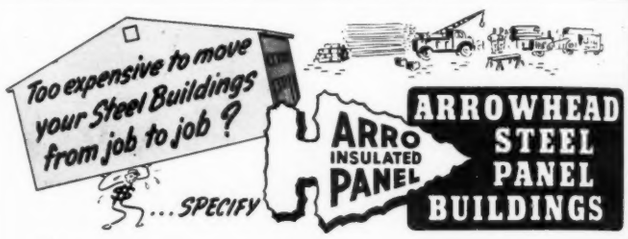
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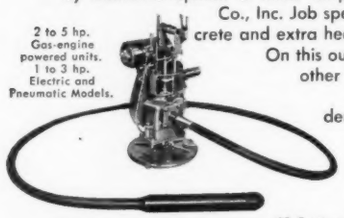

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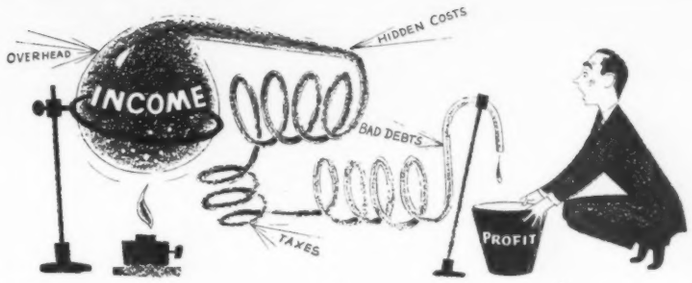
Better Nail Down Contracting Profits

Don't Let Taxes, Red Tape, Unrealistic Pricing Cut Them: Your Accountant Will Give You Helpful Advice



By C. T. SLOTE

• JOE JONES was a good general superintendent. But when he went into the contracting business for himself he discovered that there's more to constructing a road, dam, or building than knowing how to handle men, materials, and equipment. As the bank pointed out when Joe was forced to appeal for a third extension on a major loan, professional accounting guidance could have prevented many of the difficulties which were strapping him.

Sound accounting is the key to the solution of a wide variety of business problems, such as: How to maintain adequate working capital; how to save on taxes; how to price for profit; how to plan ahead for financial soundness; how to comply with government regulations. Big business for years has relied on proper accounting to supply the basic information for daily decisions. More and more small businesses are learning the same lessons.

Working Capital is Vital

Take the case of Contractor George Miller. He never seemed to have enough money on hand to get any more cash discounts. In fact, he was beginning to have a tough time just meeting his bills. Since volume was good and costs were in line, he figured things should be running more smoothly. He took the problem to a certified public accountant and asked: "Why this perennial shortage of working capital?"

Investigation disclosed several causes. One was the fact that Miller was carrying more work than he could afford to handle with his own funds. The accountant pointed out that it might be wiser to sub out some of the items—though the profits would be lower—than to do them himself and be constantly behind the financial eightball. Another cause of Miller's predicament stemmed from his large outlay on renting shores. "You spend enough on this equipment to indicate that it would be cheaper for you in the long run to buy the shores", the CPA commented. But Miller explained that he never seemed to have enough ready cash to make the investment. "That's just it", the accountant said, "you've got to plan ahead. The job now is to set up a reserve fund, so that when you do buy the shores it won't take a ruinous nip out of your working capital."

Don't Overpay Those Taxes

Experts point out that many businessmen inadvertently overpay their taxes. The reasons: ignorance of legitimate tax savings allowed by the Government and failure to plan throughout the year for the March 15 day of reckoning. Here's how two alert builders saved themselves some hard cash by simply being tax-conscious the year around.

Tom Evans put his 17-year-old son to work during school vacations to learn the business. He paid the boy approximately what he would have paid any other employee of like skill doing like work, but was careful to keep the boy's total yearly earnings under $600. He withheld taxes on these wages, and the son had to file a tax return in order to recover the payments. However, young Evans didn't have to pay any tax on the wages, since he had no other income. The father was able to deduct the cost of the wages as a business expense. Then, since he had paid his son less than $600, he was still able to list the son as a dependent and claim a $600 exemption.

A New England contractor was planning to buy a new light truck. The

(Continued on next page)

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The Quinn Standard is known as the best the world over, wherever concrete pipe is produced and used. Backed by over 35 years' service in the hands of hundreds of Quinn-educated contractors, municipal departments and pipe manufacturers who know from experience that Quinn pipe forms and Quinn mixing formulas combine to produce the finest concrete pipe at lowest cost.

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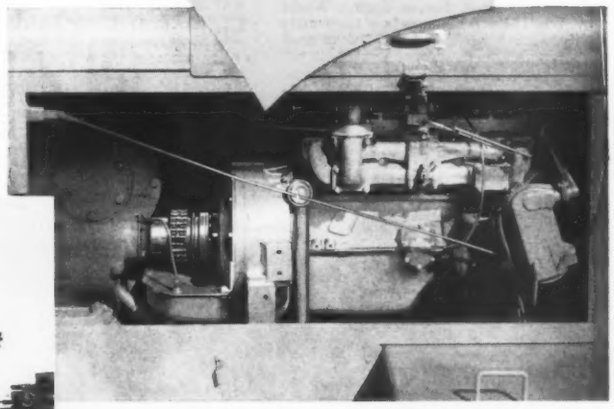
Announcing UNIT with FLUID TORQUE DRIVE

To a long line of improvements in design and construction, UNIT has added another advancement — FLUID TORQUE DRIVE. This torque converter application gives the operator a steady flow of power which he can regulate with smoothness and accuracy. Elimination of shock loads adds life to bearings, shafts, gears, and cables . . . brings maintenance costs down to a minimum. Excavating work is done with a strong steady flow of power, with no "stall" and no "delay" while the engine regains speed. Crane work can be done with greater smoothness of operation by throttle control.

UNIT offers the Chrysler Torque Converter as a standard installation at no extra cost on ½ yard machines equipped with 6 cylinder Chrysler Industrial Gasoline Engines.



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Nail Down Profits

(*Continued from preceding page*)

depreciated value of his old one on the books was $900, but since it was pretty badly worn, all he could get for it on a trade-in was $600. He talked it over with his CPA. As a result, instead of taking the trade, he made two separate transactions: he sold the old truck for $600, then bought a new one. By selling the truck for $300 less than its depreciated value he was able to deduct the $300 book loss from this taxable income. If, on the other hand, he had traded in the old truck, he would not have been allowed to claim the loss. For tax purposes, no gain or loss is considered to result from a trade-in.

Is Your Pricing Realistic?

Like many another big-city contractor, Bill Pace spent a lot of time trying to ingratiate himself with a firm of management agents in order to get their steady repair work. For a year he knowingly "sharpened his pencil" and carried their account at prices lower than he would otherwise have quoted. "After all, this may one day be a lush deal", he said. "I'm willing just to break even or drop a few pennies to cultivate it."

But when Pace called in an accountant to help find the reasons for unusually low profits that year, the CPA came up with an astonishing fact. Pace had devoted a far greater share of his over-all volume than he realized to this missionary work. Instead of merely "losing a few bucks", he was actually dropping a big chunk of his profits because this work was taking up a healthy portion of overhead. That overhead could have been spread over more profitable jobs, which Pace—too busy wooing the management agents—had not bothered to shoot for. When he realized the depth of his "dives", Pace saw that he couldn't afford to go on gambling with his profits by pricing unrealistically. He made up his mind to devote less time to courting the agent's account, and more to developing leads that would pay off in present business.

Red Tape May Trip You Up

A contractor in the Midwest felt that his estimator was justified in asking for a pay raise. Without further ado, he gave it to him.

But when his accountant discovered the boost, he was disturbed. "You've given more than the Wage Stabilization regulations allow", he pointed out. While interpretations of the regulations were still uncertain, he explained, this might mean that the man's whole salary—not just the increase—would be disallowed as an expense item on the contractor's tax return. They checked with the Wage Stabilization Office.

Taking into consideration the dozens of regulations which govern all kinds of business, one thing becomes clear: the contractor who tries on his own to keep abreast of all changes will have little time left over to spend on blueprints. This is where the CPA comes in. It's his job to stay on top of business regulations as much as it is his calling to set up and interpret business records. These records—which not only save money at tax time, but provide the facts on which vital decisions are made—are ones which the average businessman can maintain for himself unless his is a large operation. The accountant

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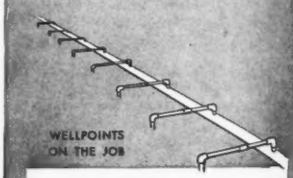

Pre-drainage with Complete Wellpoint Systems prevents trouble wherever subgrade water is a problem. By eliminating the water hazard, you usually eliminate any need for sheeting — you often are able to continue operations even in sub-zero weather — you frequently can use equipment which "wet grounds" would rule out—and you always can count on completion in scheduled time at scheduled costs!

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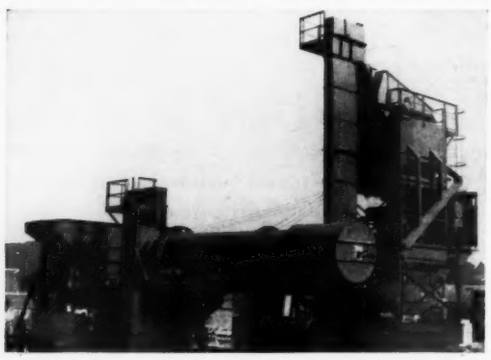
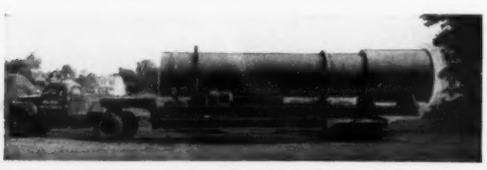


Here's proof that Cummer Plants are portable. The Blue Ridge Asphalt Paving Co's. big plant pictured above was transported from Cleveland to Virginia by truck. In the picture below the Cummer dryer for this plant is on its way through the Blue Ridge Mountains.



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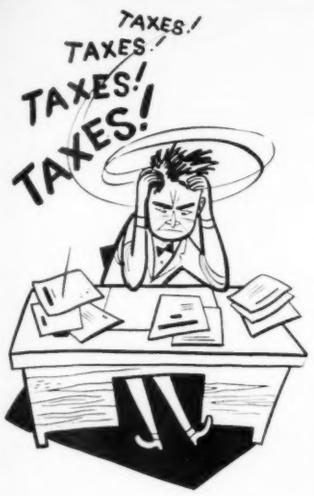


can be engaged for weekly, monthly, or quarterly checkups, depending on the needs of the individual business.

We All Want to Plan for Profit

No one but the entrepreneur himself can ever make the basic decisions on which his business stands or falls. But accounting can provide the contractor with information that ultimately leads to a sound action. Take the case of Fred Dale, a small general contractor in New York.

He'd never done any public work before, but when a school job came up he decided to go after it. First he talked it over with his accountant, who agreed that Dale's business had enough working capital on hand at the moment to justify tackling the job. "But let's work out a seasonal forecast just to make sure you won't be overextending yourself financially", the CPA advised. Actually, it consisted of two forecasts—one showing the over-all sales, purchase, and expense picture, the other showing the contractor's likely cash position month by month.

With this in hand, they discussed the peculiarities of public work: payment is at least a month behind requisition; final payment is generally delayed longer than in private work; and then there's the one-year guarantee period to think about. In the light of these facts, and the financial forecasts, it became obvious that taking the school job might mean tying up funds that would be needed for regular cash purchases and expenses. Dale decided that this wasn't the best time to break into public works. He would go after similar-sized private work on which there would be faster return.

Buy Accounting Intelligently

The CPA's increasingly important role as adviser to management explains the fact that accounting is today one of the fastest-growing professions in the country. The accountant doesn't come by his credentials lightly. In order to receive his certificate he must pass exacting state examinations, and satisfy state officials that he has both the education and experience necessary to serve business owners. But accounting service is like any other purchase: you should know what you need and what it should do for you. Naturally, no two businesses will require identical accounting aid. That's why independent accountants tailor their work to each client. However, in opening your relationship with your CPA, here are a few general questions to put to him. The American Institute of Accountants suggested them:

1. Am I taking advantage—especially through advance planning—of legitimate tax savings?
2. Are there any overhead or other costs I haven't included in my pricing?
3. How does my inventory shape up?
4. Am I accepting—or giving—too much credit?
5. Are my finances under control?
6. Have I missed any logical places to shave costs and expenses?
7. Do I seem to have adequate insurance coverage?
8. Generally, do you think my business is in good health?

If your business is sound in the first place, it won't take your CPA long to give you the answers—after examining your records. If not, it's a good thing to learn why as soon as possible. In either event, you've made a good investment.

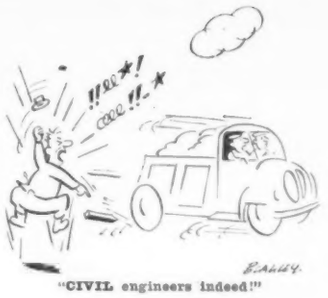
The construction industry is basic in our economy. Remember that it is in the national interest—as well as your own—to keep operating profitably.

This article was prepared with the cooperation of the American Institute of Accountants.

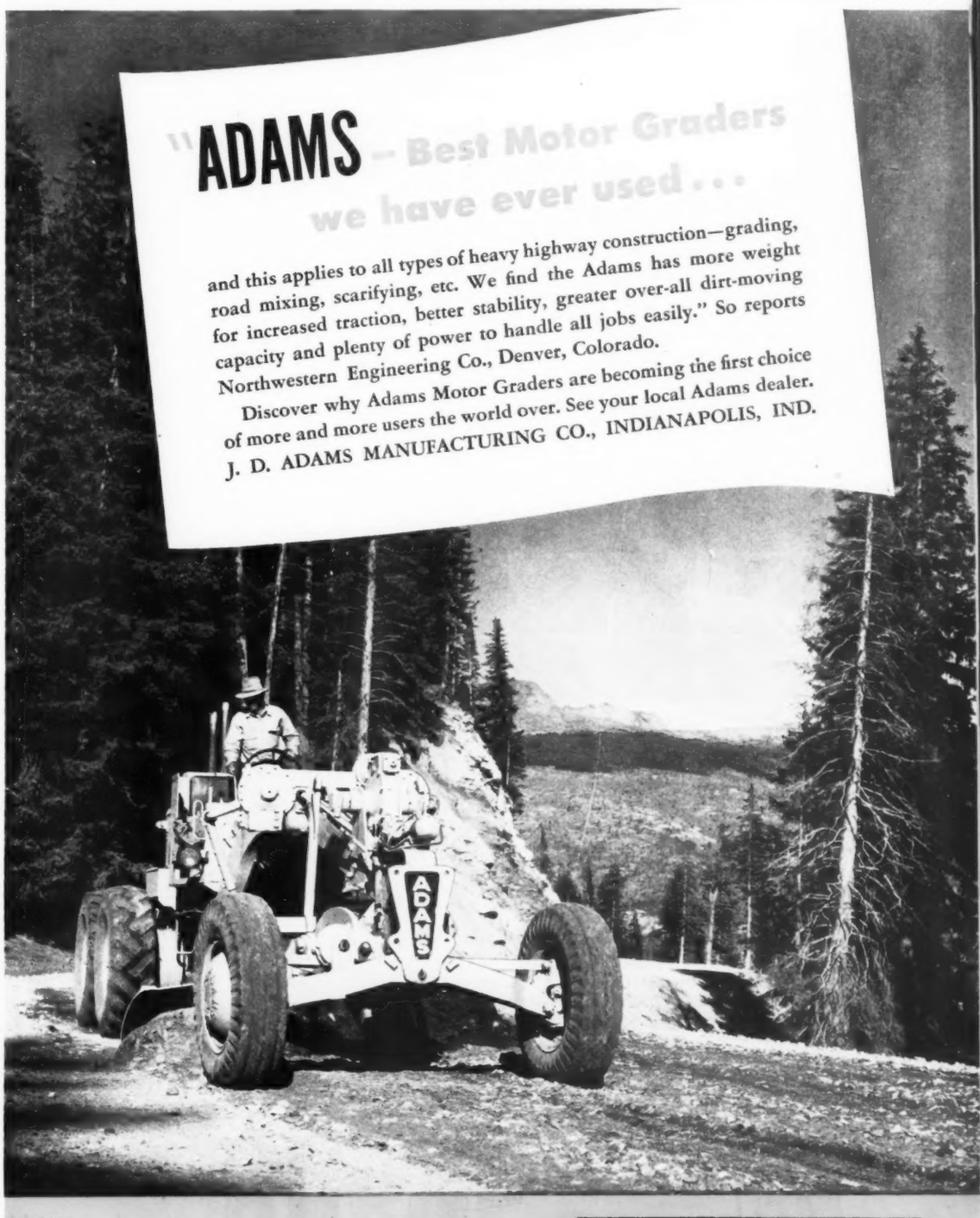
"Dempsey Punch"

The biggest cannonball ever made was never intended to be fired from a gun. Nevertheless, the 5-ton sphere of manganese steel has destruction for its purpose. At the end of a 50-foot steel cable suspended from a 90-foot boom, the ball swings in monstrous arcs and quickly demolishes old slum tenements. Its wallop has been dubbed the "Dempsey punch".

In clearing 1,200 buildings for Peter Cooper Village and Stuyvesant Town apartment developments in New York City, four of these wrecking balls knocked down an average of six six-story buildings a day. "Small wonder", says *Steelways*, magazine of the American Iron and Steel Institute, "that one of our great wrecking companies proudly takes as its motto the Latin phrase 'Qui Frangit Utilis'—'He also serves who destroys'."



"CIVIL engineers indeed!"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Heavy-Duty Chassis

A new-model chassis developed for heavy-duty services has been announced by the Sterling Division of The White Motor Co., Milwaukee 1, Wis. The SB 3255D is powered by a 200-hp diesel engine. Dual transmissions, a four-speed main and three-speed auxiliary, give the operator a wide selection of gear ratios. Top speed is 42 mph in overdrive and, with both transmissions in low gear, total reduction is more than 120 to 1, resulting in a road speed as low as 2½ mph at full engine-governed speed.

Equalizer beams mounted below the rear springs provide for equal distribution of the load and serve as a lever to help lift the load over bumps. The beams and the torque rod system are said to absorb most of the strains and shocks before reaching the springs, making it unnecessary to use heavy, oversize springs. In addition, the low center of gravity afforded by this design eliminates "chattering" and increases tire life.

The new heavy-duty Sterling-White chassis, SB 3255D, is powered by a 200-hp diesel engine. Steering is of the hydraulic power-actuated type.

Standard tire sizes are 11.00 x 24 front and 12.00 x 24 dual rear mounted on ventilated steel disk-type wheels. The steering is of the hydraulically power-actuated type. The side members are heat-treated alloy-steel channel of $\frac{3}{8}$-inch material thickness, $11\frac{3}{4}$ inches deep, lined with a full length $\frac{3}{8}$-inch-thick channel reinforcement and the full-length wood insert.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 792.

Popular Dryer-Mixer Unit Described in New Bulletin

A new 8-page bulletin presents complete design data, mechanical features, and job-application information on the popular dryer-mixer unit manufactured by Barber-Greene Co., Aurora, Ill. The bulletin outlines the reasoning behind the Mixall's development, and clearly illustrates its wide application.

The machine is said to be an answer to the great need for quality hot patch material. It can mix both Portland cement and bituminous materials in any weather and quantity from a 300-pound batch up to 10 tons per hour.

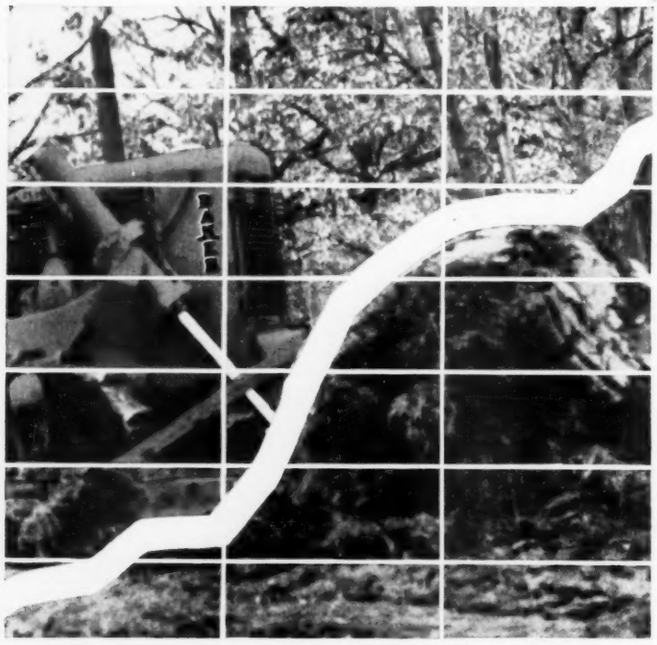
The Mixall is self-powered and consists of a skip, rotary-drum dryer, and a twin-shaft pugmill mixer. The skip may be charged by shoveling directly from the truck, shoveling from a stockpile, or by wheelbarrow. The flights in the rotary drum drop the material through a blast of hot gases until it is dry. After discharge to the pugmill, the correct amount of bitumen is added.

The unit can discharge directly into the patch, into wheelbarrows, or in windrows for stockpiling.

Mixall Bulletin 804 may be obtained from the company, or by using the Request Card at page 18. Circle No. 722.

Sets Up Division to Do Geophysical Exploration

With a view to offering engineering and exploration service in foundation, soil-corrosion, and prospecting work, Georator Corp., Arlington, Va., has formed a Geophysical Exploration Division. E. R. Shepard heads it up; he was formerly in charge of Geophysical Foundation Exploration for the Army Corps of Engineers and the U. S. Bureau of Public Roads. Well-logging and special electrical investigations are another feature of the new division, and this work comes under the supervision of S. Krasnow, Chief Development & Research Engineer of Georator Corp.'s Geophysical Instrument Co. Division.



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The fishtail design of the Pengo Jr., makes for rapid penetration in hard-to-bore soils and less tendency to pivot, Peterson Engineering Co., Santa Clara, Calif., claims.

Fishtail-Type Bit Speeds Earth Boring

A new pilot bit for Danuser augers is produced by Petersen Engineering Co., 460 Kifer Road, Santa Clara, Calif. The Pengo Jr. features a fishtail design which is said to eliminate the center-point and the resulting tendency to pivot on stones or hard ground.

Forward-angled cutting lips on either side of the center line slice a pilot hole ahead of the wedge-shaped main pilot blade. This in turn breaks up the earth ahead of the auger helix. Rapid penetration in hard-to-bore soils and fast boring in ordinary ground are features claimed by Petersen for the new unit.

The Pengo Jr. is cast from special abrasion-resistant alloy and is heat-treated for maximum service life. It is equipped with standard thread to fit all Danuser augers from 6-inch diameter up.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 748.

A Wheelbarrow Base For Engine-Generator

A wheelbarrow-base type of attachment for engine-generator sets has been developed by Wincharger Corp., E. 7th and Division Sts., Sioux City 2, Iowa. The Model 187 Speedy-Shift is used with the Models 700 and 1800 engine-generators, and Model 543 is used with the Model 5000 engine-generator. The single handle permits the unit to be pulled instead of pushed over rough surfaces.

In conjunction with the unit's double legs, sturdy semipneumatic rubber-tired wheels provide a secure footing and accept the largest possible portion of the total weight of the unit. The base comes complete as a package and may be attached or detached from the standard cradle base in a matter of minutes.

Portability of the engine-generator sets has been enhanced by the use of a belted construction which is said to permit higher, more efficient operating speeds and maximum weight reduction for both engine and generator.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 708.

Wire-and-Cable Catalog

A 186-page catalog on its line of wires and cables is offered by United States Rubber Co., Rockefeller Center, New York 20, N. Y. It contains comprehensive data on construction and operation of control and signal cables, railroad wire and cables, mine cables, and portable cords. It includes a detailed technical engineering-data section.

This literature may be obtained from the company, or by using the Request Card at page 18. Circle No. 749.

Structural Pipe Fittings

Many uses for Nu-Rail aluminum-alloy slip-on fittings are illustrated in the new bulletin of the Hollaender Mfg. Co., 3841 Spring Grove Ave., Cincinnati 23, Ohio. Nu-Rail corrosion-resistant pipe fittings are said to eliminate threading or welding and save cutting pipe, thereby reducing time and costs in the construction of permanent and temporary pipe structures. The five basic fittings, plus a floor and wall flange and a drive-fit end cap, fit standard pipe in sizes from ¾ through 2 inches, and may be used individually or in combination to make practically every type of fitting desired.

The bulletin points out that although assembly and disassembly are easy, the fittings are locked with two knurled, vibration-proof, hollow-set screws which cannot work loose.

This literature may be obtained from the company. Or use the Request Card at page 18. Circle No. 793.

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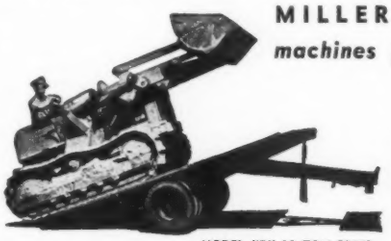
MILLER Tilt-Top CUTS slow machines job-to-job travel time!



MODEL "B" 10 TON $1175. The following equipment is optional and extra: hydraulic tilt control, two speed winch, electric brakes.

Where large flat bed trailers are usually too cumbersome for lighter hauling . . . a MILLER Tilt-Top is always handy for moving slow machines from one operation to another. Self-moving equipment practically loads itself onto tilted platform and can be towed to the next operation in jig time . . . cutting non-productive time for operator and equipment to a minimum. Standard platform is 14' x 8'; optional 16' available.

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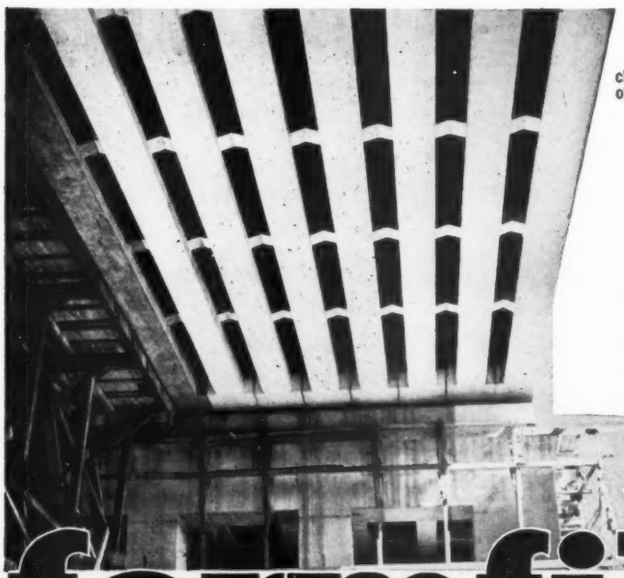

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Lime-Stabilization Experiments in Texas

Texas District 14 Tackles Economic and Resource Problem In Search for Low-Cost Flexible Base

• TEXAS, like other states, needs thicker and better road bases, according to H. C. Carter, District 14 Construction Engineer, Texas Highway Department. In a paper presented at the 50th Anniversary Meeting of the American Road Builders' Association, Carter pointed out that District 14 has 1,600 miles of asphalt-surfaced roads. Due to lack of replacement during World War II and the increase of traffic and loads in recent years, some of these roads have broken up and become too rough for safe and comfortable use. Better bases are essential.

But it also has become increasingly difficult to find native base material. In the district there are few deposits of local material that will meet present flexible-base specifications without using an additive or crushing, and frequently both are required. The district has therefore turned to stabilization.

Field Experiments With Lime

Experiments with stabilization in the district may be divided into two periods: first, during the last war; second, from the end of the war till today.

During the war, short sections were constructed by maintenance forces. The very first one was built after all efforts failed to find a material that would reduce the plasticity of existing selected material on highway sections in Williamson County. During the study, large stockpiles of waste lime had been noticed at nearby plants. Lab tests indicated that waste or commercial lime would produce the results desired. The District decided to try it.

The average plasticity index of the existing flexible bases was 17, the average per cent of soil binder, 43. Waste lime was admixed at 3 per cent (by weight) with the top 6 inches of base. The resultant plasticity index was 8, the per cent of soil binder, 27. Lime had done the trick.

Since the end of World War II, 87 miles have been treated with waste and commercial hydrated lime at depths of from 4 to 8 inches. The width of stabilization has varied from 20 to 60 feet. On all the projects, 3 per cent by weight of lime has been used; the materials treated have been "inferior" (containing aggregate and usually with a plastic binder). The projects have been in areas where local fine or blow sand was not available. Usually the materials have been road-mixed by blading, though on some city work the materials were premixed and hauled to the street.

Road-Mixing

For the projects mixed directly on the roadway, the gravel, dumped in the center of the road, was evened by blading and a trench was left in the center. This held the lime to avoid waste (since it will flow ahead of the blades). To "wrap up" the lime, the windrow was bladed back to the center, then it was cut in half, and each half bladed out to the crown line. The left windrow was then completely bladed across the road to the right, forming one windrow which was, in turn, bladed completely across to the left. One half was then carried back to the right. The material was "laid in" by taking a cut from one windrow, carrying it uniformly across the roadway, then taking a similar cut from the other windrow. Lastly, the remaining windrows were bladed to quarter points, and the edge "laid in" in light lifts. Each lift was sprinkled and rolled as it was placed. The thoroughness of the mix could be detected by the eye because of the whiteness of the lime.

Premixing

In mixing for city-street work, the material was dumped in windrows on a nearby open area. The lime was added and the material bladed in the same manner as in the road-mixing work. After the material was thoroughly mixed it was hauled to the job, bladed, and sprinkled in light lifts. Sprinkling was controlled to insure a total moisture content of about Proctor optimum or a little dryer. The completed base was then maintained in a damp condition by sprinking for three or four days.

It required approximately one hour of blading time to mix the lime with each 50 cubic yards of "inferior" base material. On the average, 100 pounds or 2 sacks of lime were used per cubic yard compacted.

Here are some typical test results before and after treatment:

	Per Cent Retained On							
	2"	1"	½"	¼"	40	LL	PI	LS
Flint gravel	0	13	26	39	73	39	24	12
Same +3% waste lime	..	11	25	37	72	34	6	3
Iron-ore gravel	0	4	29	40	75	41	25	10.1
Same +3% waste lime	0	2	24	35	73	35	9	4.0
Limestone gravel	0	12	32	50	69	29	17	9.0
Same +3% lime	..	..	..	..	73	30	8	3.6
Granite gravel	..	0	15	40	88	43	22	8.3
*Same +15% fine sand +3% lime added at same time	..	0	11	33	75	32	5	3.1

Costs

Furnishing, emptying, and disposing of the lime sacks on contract work has ranged from $16 to $21 per ton; on state force-account jobs, from $17.15 to $21.33. These, however, are 1949

It's the Operators'

BEST BY A DAM SITE. Troy Hood and Jack Rank (shown here with Dirt Foreman Sam Crawford) operate TD-24s for Guy H. James, building the great Oahe Dam in South Dakota. Hood says: "I can keep right behind the scrapers—catch 'em sooner and push 'em out faster because TD-24 controls are easier." And Rank chimes in: "Much easier to handle than any other tractor."

"ALMOST THINKS FOR ITSELF!" That's what Jess Leatherwood says about the Big Red TD-24 he operates for Macon Construction Co., Franklin, N. C. "It pushes more, moves it faster and handles easier than any other crawler I've ever been on."

"WE RIP PLACES YOU'D USUALLY HAVE TO BLAST," says another Macon operator, Roy Cantrell. "We've been working in the Blue Ridge Mountains on rock you couldn't touch with a dozer till the TD-24 came along. Now we blade where we couldn't scratch before, and rip where we used to dynamite!"

"OUR TD-24s REQUIRE LESS SERVICE," says John Tickler, Service Superintendent for John E. Bloomer Construction Co. "These big red machines are very accessible, very easy to maintain. And when we do need help, the International Distributor is always on the job"

figures, and may be low by now. Assuming the cost of lime at $20 per ton in place on a windrow, this would amount to $1 per cubic yard of compacted stabilized base. The cost of inferior base material, plus hauling, blading, sprinkling, and rolling, could be determined for any given locality. To this amount should be added approximately $1.26 per cubic yard or 21 cents per square yard, 6 inches thick, to obtain the cost of lime stabilization.

Cautions and Recommendations

Stabilization with lime requires complete preliminary lab study and close control during construction. For the effect of lime on plasticity, the District Laboratory combines the material and lime and then adds enough water to bring the soil binder to approximately its plastic-limit consistency. The material is then compacted by hand into one mass in a pan, allowed to set for seven days at room temperature, and then broken up, slaked, and washed. The soil tests are run in the usual manner on the prepared binder. Lime mixtures, of course, harden slowly and their strength increases for some time after mixing.

Not all materials react to lime; some show no reaction, others become very hard and durable. It is believed that the cementing agent is calcium silicate and the silica must be furnished in fine form.

Part of the expense of lime stabilization comes from hydrating the quicklime, separating, sacking, and opening, emptying, and disposing of the sacks. Accordingly, the District has conducted a limited lab test to see if lime can be added in solution. The results indicate that quicklime can be hydrated with up to 150 per cent moisture. The lime stays in solution, and the mixture can be pumped or will flow through gravity spraybars. This method, however, has not been tried in the field.

Some of the projects treated 4 inches deep are now showing signs of distress, though the 6-inch or thicker bases are very satisfactory to date. It is possible that present-day loads are causing excessive deflections in the subgrade and destroying the hard thinner bases. Time will tell how permanent is the effect of lime on plasticity.

s' Crawler!

TD 24

Read what the operators and servicemen say about "Big Red", the International TD-24...

"HOW DO I LIKE 'BIG RED'?" asks George Miller. "Listen: This TD-24 is just the fastest and surest handling tractor there is, that's all! Nothing I've seen can touch it for moving dirt." George and his TD-24 move dirt in North Carolina for Kiker & Yount Construction Co.

"GREATEST THING I'VE SEEN," says Bruce Olson (right), TD-24 operator and Sec.-treas. of G. A. Olson Construction Co., Marshall, Minn. "The TD-24 is the easiest crawler of all to operate. The high-low shift is great for whipping around to the cut after dumping the load. It's the fastest equipment going for anything up to a 3,000-foot cycle!" Man in center is Glen Olson, Bruce's brother and company president. At left is Superintendent Donald Young.

Ask the men who know. Ask the operators. They know that *this* makes "Big Red" the Champ:

TD-24 POWER
148 maximum drawbar horsepower, more than any other crawler on the market.

TD-24 SPEED
Up to 7.8 m.p.h. with 8 forward speeds, 8 reverse. Moves loads faster, gets back quicker for more work-cycles per hour.

TD-24 STEERING
Fingertip control for pivot-turns, feathered-turns and *turns with power on both tracks.*

TD-24 STARTING
Exclusive International push-button starting for quick starts any time in any weather.

Want to know more reasons why the Big Red TD-24 is the work-champ of the world?

Ask your International Industrial Distributor. Ask TD-24 operators. Ask the men who know—and you'll be a TD-24 man yourself from then on in!

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POWER THAT PAYS

International Bond Issue Proposed for European Highways

For the first time since the collapse of the Roman Empire, highways are being built in Europe that follow common specifications and agreed routes. The six governments participating in the Schuman Plan (the project that would coordinate western Europe's coal and steel industries) are following a master road map worked out in the Transport Committee of the United Nation Economic Commission for Europe.

But the highways have not been taking shape quickly enough to satisfy Europe's rapidly developing road-transport industry, and a recent proposal by the International Road Federation may prove to be the solution—at least from the financial point of view.

The IRF's proposal is for nothing less than a huge international fund for financing the construction of trans-European highways; the Transport Committee of the U. N. Economic Commission for Europe, to whom the proposal was made, has approved it in principle; and the Committee is now organizing an institution to establish and manage the program.

The central idea of the highway project is that the governments concerned, by properly utilizing resources already committed to highway construction, could mobilize large amounts of investment capital now difficult or impossible to tap for productive purposes. The proposed international fund would be for the purpose of underwriting by inter-governmental guarantee securities corresponding to the highway bonds issued by American states. To take an example: France is planning to spend about 50 billion francs ($145,000,000) on highway construction during the next ten years, financing it from gasoline taxes; under the new arrangement she would pledge to the international fund those 50 billion francs of tax revenue for the purpose of paying interest on highway bonds. Then, by floating these securities in Europe (and possibly elsewhere), the fund could raise many times 50 billions, with which France would undertake construction in the immediate future.

Highway experts are basing their confidence in this plan on American experience with bond financing. They feel that not only would the plan cost nothing more than is already committed by governments, but also that the building of highways would so increase traffic (and consequently receipts from gasoline taxes) that the program would quickly pay for itself.

France, Italy, Western Germany, Belgium, the Netherlands, Luxembourg, and possibly Switzerland are the countries most likely to enter the highway plan. How large the fund would be it is not yet possible to estimate. But something between $3 billion and $5 billion worth of bonds could, it is thought, be financed on the basis of present government outlays for road building. Though western Europe today is not likely to produce such an amount, it should be possible to float issues up to the limit of what the market would accept, starting with modest amounts and building up to larger sums.

Color-Coded-Hose Booklet

An 8-page booklet on its color-coded hose has been prepared by The Thermoid Co., 400 Whitehead Road, Trenton, N. J. The five types of hose include Versicon, Versaflex, Aquair, Utility, and Powerflex. The booklet gives details of construction, sizes, lengths, pressures, recommended couplings, and uses for the hose line. It lists the color code for each type of hose.

This literature may be obtained from the company, or by using the Request Card at page 18. Circle No. 773.

Concrete Hauler Can Settle Dust Problem

Dust was a major problem on B. & O. Railroad Tunnel No. 1 near Clarksburg, W. Va., as the contractor, Bates & Rogers Construction Corp., Chicago, Ill., soon found during the dry summer weather. Constant movement of trucks over the road outside and the floor of the tunnel caused the top of the ground to become so powdery that workers' vision and health were both suffering.

But it wasn't long before the contractor came up with a solution. Four 4C Dumpcretes were used to haul central-mixed concrete from the job-site plant. Bates & Rogers made an opening in the bottom of one of these Dumpcretes and added a pipe which ran to the rear of the truck, where a spraybar was added. As often as needed, the body was filled with water to wet down the dust. The rest of the time this body was kept busy with the three others supplying concrete.

Bates & Rogers also added a special subframe to give the Dumpcretes a discharge height of more than 7½ feet (average height is 6 feet 4 inches). With this added height it was possible to place concrete directly into the 36-inch wall forms on both sides of the 3,236-foot-long 28-foot-high double-track tunnel.

This is how Bates & Rogers Corp., Chicago, Ill., fixed up one of its four 4C Dumpcretes as a dust-layer on the B. & O. Railroad Tunnel No. 1 job. From an opening in the bottom, a pipe runs to the rear of the truck, where there is a spraybar. Fill the body with water—then watch it wet down the dust.

Job-Application Folder

An illustrated 4-page folder featuring on-the-job applications of the truck-mounted Bantam is being released by the Schield Bantam Co., Waverly, Iowa. The new folder presents actual job applications and production records of Bantam owners, with illustrations of their machines in operation. The job records illustrate the Bantam used as backhoe, pile driver, clamshell, dragline, shovel, crane, magnet crane and with various grapples.

This literature may be obtained from the company, or by using the Request Card that is bound in at page 18. Circle No. 763.

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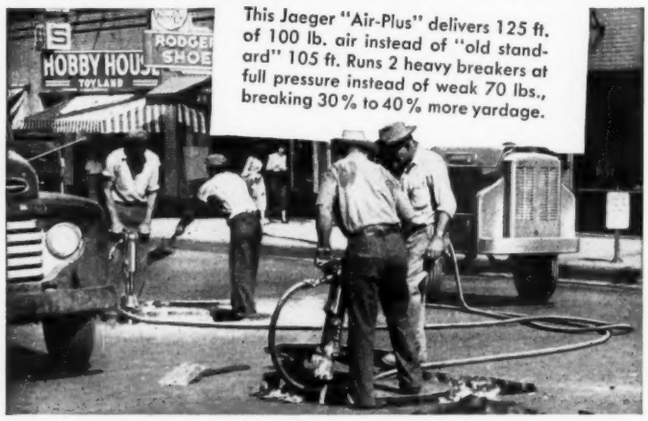

This Jaeger "Air-Plus" delivers 125 ft. of 100 lb. air instead of "old standard" 105 ft. Runs 2 heavy breakers at full pressure instead of weak 70 lbs., breaking 30% to 40% more yardage.

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125 ft.	Jaeger from Model 75 that holds full pressure in a heavy pavement breaker
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250 ft.	spare for hand-held drills. Jaeger Compressors deliver this 15% to 25%
365 ft.	extra air at lowest cost per cubic foot of air of any compressor.
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Double-Layer Hot-Mix Refinishes U. S. 79

Contractor Reconditions Old Road Before Laying Asphaltic Concrete Base and Surface Course

By MICHAEL A. SPRONCK

• THIS year the Arkansas State Highway Department is converting many miles of its treated-gravel roads to blacktop. A 17-mile section of U. S. 79 south of Pine Bluffs is typical of the work being done. Many areas of the old road—7 inches of gravel with a double seal about ½-inch thick—were showing the effects of increasing traffic loads. The improvement contract called for removal of the broken areas, repacking and resealing, and surfacing the entire section with two layers of hot-mix to a 22-foot width. New 7-foot stabilized gravel shoulders were also included.

Sam Finley, Inc., bid a low $471,170 on the contract, and work started April 5, 1952. Finley subbed the reconditioning of the original surface of D. F. Jones Construction Co., Little Rock. Jones used a Galion patrol grader to scarify the bad spots and blade the material to the side of the road. The holes were repacked with new crushed stone, rolled with a 10-ton Tampo rubber-tire roller pulled by a Hough Payloader, and sealed with MC-1 cutback asphalt. Hand-spray methods sufficed for the small spots, but a road distributor was required along some of the extended sections.

With the original material brought up to par as a good tight base, Jones primed the entire road area with an MC-1 cutback. A Rosco 1,000-gallon distributor with a 24-foot folding spraybar shot the asphalt on at the rate of 0.1 gallon per running foot. Jones followed up in three to four days with a stone binder, then worked on the new shoulders. The shoulders are 7-feet wide on each side and contain 20 yards of gravel per 100 feet.

As this preliminary work was being done, Finley set up a plant at the north end of the job. The plant site was adjacent to a railroad spur, 2 miles west of the highway. The plant itself was built around a 3,000-pound Hethering-

C. & E. M. Photo

This Barber-Greene finisher laid down the two hot-mix courses of asphaltic concrete on the U.S. 79 job in Arkansas. Sam Finley, Inc., was the contractor.

ton & Berner pugmill and produced an average of 65 tons of hot-mix per hour. Spex called for two mixes—Type 1 for the 2-inch base course and Type 3 for the 1½-inch surface course.

Finley had an International TD-14 tractor-dozer and a Lorain 41 with a ¾-yard Haiss clam bucket working the stockpiles. There were five piles: 1¼-inch, 1-inch, and ½-inch stone, and coarse and fine sand. The material was charged into a 10-ton 2-compartment feed bunker, fed into a 7 x 12 cold elevator, and passed up into a 60-inch-diameter dryer. A single-jet Houck burner supplied heat to the materials passing through the 24-foot length of the dryer. The hot elevator carried the aggregates up these 4 x 8 vibrating screens. Finley found that a 1¾, a ⅜, and a ¼-inch screen gave the proper balance of materials for the mix. The aggregates then fed from the hot bins into the 3,000-pound H & B pug, where a 65 to 75-penetration asphalt was added. The asphalt was supplied by

(Concluded on next page)

WHEN DIGGING'S TOUGH, THIS DIPPER'S TOUGHER

How service and manganese steel are cast and welded into AMSCO Dippers

More than 5,000,000 cubic yards of rock and abrasive materials have been dredged by one AMSCO All-Manganese Steel Dipper similar to this 1¾-yard model—and the end of its service is nowhere in sight!

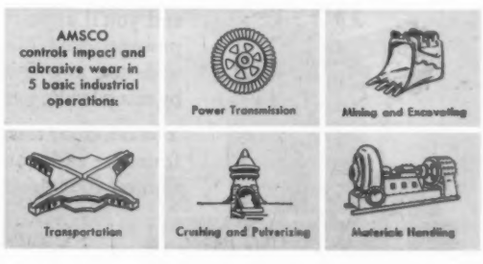
Service like this is expected—and considered normal—by users of AMSCO Dippers. Just as users throughout all industry know that AMSCO Manganese Steel Products mean service and long life wherever impact and abrasion must be controlled. AMSCO Manganese Steel has the unique quality of actually becoming harder with use, acquiring a high surface polish to shrug off grinding abrasion, while retaining body metal toughness.

Made *entirely* of "The Toughest Steel Known," AMSCO Manganese Steel Dippers use no rivets, but are fabricated by the modern, streamlining Plug-Welding method that permanently interlocks cast segments. AMSCO All-Manganese Steel Dippers are available in two-piece welded, three-piece renewable lip, and Missabi designs—or can be adapted to your unusual materials handling specifications. Also available in sizes to fit all power shovels.

Check these additional PLUS features:

- One-piece Manganese Steel back casting.
- Top and bottom have cast-in, double-wall box-sections for maximum strength, minimum weight.
- Cast-in pin connecting lugs for handle, back, braces, bail.
- Bail is a one-piece casting with elongated tubular cross-section, for strength and lightness.
- Teeth are set for clean, fast digging.
- Interior is smooth and slightly tapered for free dumping.

Contact your shovel manufacturer about AMSCO Dippers, or write AMSCO, Chicago Heights, Illinois.



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Double-Layer Hot-Mix Refinishes U. S. 79

(*Continued from preceding page*)

McMillan Petroleum Co., El Dorado, Ark., in 4,000 to 5,000-gallon semi-trailers and was fed into an 8,000 and a 10,000-gallon steam-jacketed storage tank at the plant.

Five to ten trucks, depending on the haul, carried the 7½-ton batches out to the road. A Barber-Greene finisher handled the laydown. The Type 1 base course went down at a rate of 200 pounds per square yard, the Type 3 mix for the surface course was applied at a rate of 150 pounds per square yard. Finley worked one lane of the 22-foot road on one day and then the other side the next day. A Buffalo-Springfield 8 to 12-ton and an Austin-Western 5 to 7-ton tandem roller handled the rolling.

J. B. Webb, General Superintendent, directed the contractor's forces, with H. E. Smith as Materials Engineer.

C. & E. M. Photo

The plant setup, which was built around a 3,000-pound Hetherington Berner pugmill, produced an average of 65 tons of hot-mix per hour.

The State Highway Department, which is headed by Olen Fullerton, Director of Highways, was represented on this contract by Gayle Dunn, Resident Engineer, and E. E. Mashburn, Construction Engineer.

Utility-Trencher Catalog

A bulletin summarizing the principal operating features of the Model 88 Trenchmobile has been issued by the Parsons Co., Box 431, Newton, Iowa. The rubber-tired Trenchliner is said to handle all types of utility trenching.

It digs in widths of 8 or 12 inches with variable digging feeds up to 20 feet per minute and in depths to 5 feet. The bulletin points out that with its pneumatic-tire mounting, automotive-type steering, and hydraulic brakes, the Trenchmobile can be driven safely through traffic from one trenching job to the next at road speeds up to 12.6 mph.

Features of the Trenchmobile illustrated in the bulletin include the telescopic ladder-type boom for undercutting sidewalks and old mains; controlled discharge through the reversible and shiftable belt conveyor; the hinged crumber for making vertical set-ins; friction clutches for controlling boom hoist, engine, and bucket-line speeds; Parsons self-sharpening Tap-In bucket teeth; and the positive down-crowd digging boom that maintains accurate grade.

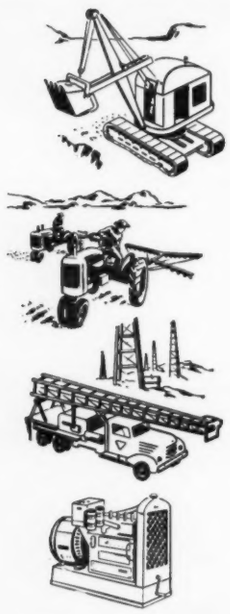
The 88 Trenchmobile is constructed on an arch-type welded frame; is powered by a standard-make 43.6-hp gasoline engine; and is one-man operated for all digging and traveling operations. It is available with an optional backfill blade.

This literature may be obtained from the company, or by using the Request Card at page 18. Circle No. 757.

New Headquarters for M-C&S

In order to provide consolidated facilities for its expanded New York headquarters, Merritt-Chapman & Scott has moved from the Whitehall Building, 17 Battery Place, to 260 Madison Ave., New York, N. Y. The company, active in the fields of industrial, building, marine, and heavy construction, has other offices in Cleveland, Ohio; New London, Conn.; Boston, Mass.; Dallas, Texas; Norfolk, Va.; and Jacksonville, Fla.

THE BUYWORD FOR DEPENDABLE IGNITION • • •



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For, there's an American Bosch Magneto precisely engineered for all replacement needs . . . for the largest, heavy-duty engines, right down to the Magnetos required for the most modern, high-speed power units.

Moreover, there's a generous trade-in allowance for you on the old magneto you replace. Make American Bosch Magnetos your "buyword" for dependable ignition. Write for new 92-page catalog, including application data. American Bosch Corporation, Springfield 7, Mass.

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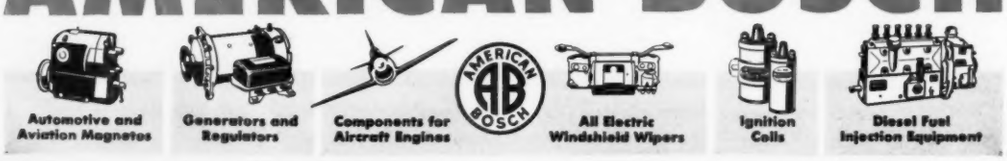

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Heavy-Duty Fork Lift

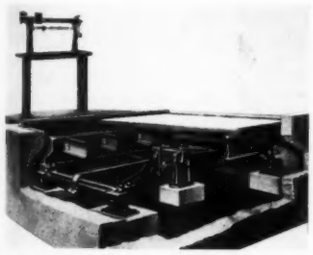
A new-model heavy-duty fork-lift truck has been added to the line made by Tracto-Lift Co., 2011 Baltimore Ave., Kansas City, Mo. The Power King features over-size pneumatic tires on a basic tractor unit, for maximum traction and power. The company claims that the unit's ability to travel at tractor speeds, maneuver, clear openings, climb, and operate in sand and mud, makes it particularly useful for storing or stacking of bulky materials.

Lifting capacities are from 10,000 to 15,000 pounds. Fork lengths range from 36 to 108 inches in 6-inch variations. Power Kings climb inclines up to 20 per cent, have 6 speeds forward and reverse, and 12-inch underneath clearance for operation on rough, unpaved ground.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 705.

New Axle-Load Scales

A complete line of heavy-duty axle-load scales for checking weights on each axle of trucks and trailers is announced by The Howe Scale Co., Rutland, Vt. The scales are designed for accurate axle-load weighing to comply with state laws and protect commercial carriers from highway stoppages for overloading, unnecessary load transfers, and costly fines.



The Howe line includes nine standard models with a capacity range of 15, 20, and 30 tons. Platform sizes are 4, 6, or 8 feet long x 10 feet wide.

The scales feature a 3-lever pipe-lever system with fewer parts, levers, knife edges, connections, and friction points, claims the company. This system incorporates a ball-bearing principle of construction which is said to save wear on knife edges and bearings, prolong scale accuracy, and reduce maintenance.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 739.

Concrete-Handling Bucket

A concrete-handling bucket with swinging gate is the subject of a new bulletin released by Henke Mfg. Corp., 100 Main St., Janesville, Iowa. It illustrates the Sure Shot Models 12 and 16 which have capacities of 12¾ and 16¾ cubic feet.

These units feature a curved end to allow free discharge, a reinforced nose to prevent damage to the discharge gate, and a flat back for fitting snugly against walls and forms. Model 12 is 6 feet 4 inches long and weighs 360 pounds. The larger Model 16 is 7 feet 2 inches long and weighs 430 pounds.

This literature may be obtained from the company, or by using the Request Card that is bound in at page 18. Circle No. 795.

Three New Directors for IRF

Three new directors have been elected by the International Road Federation. They are: Arthur J. Wieland, General Manager, Ford International, New York, N. Y.; William B. Greene, President, Barber-Greene Co., Aurora, Ill.; and Chauncey B. Smythe, President, The Thew Shovel Co., Lorain, Ohio. Chairman of the Board (now completing his first year in this position) is Frank T. Magennis, of the Goodyear Tire & Rubber Co., Akron, Ohio.

The IRF is highway-transportation consultant to the United Nations.

MODEL W HIGHWAY SPREAD-ALL

The above shows the Model W Hi-Way Spread-All which has recently been developed and has gone through many actual tests in the past year. Today we feel it is by far the most outstanding spreader of its kind on the market; the entire mechanism can be driven from an auxiliary gasoline engine, or from the power take-off on the truck, or through a V-belt drive on the drive shaft of the truck. It is available in different sizes to fit all of the different lengths of trucks. The clutches to throw the mechanism in and out of gear are controlled from within the cab by either vacuum or air controls, and the feedgate adjusting the amount of material to be spread is controlled from the cab of the truck, thus making this a one-man-unit. Notice the streamlined appearance.

MODEL DD TAILGATE SPREADER

Here is the economical *all-purpose, all-weather* Spreader—used in the summer for dust control and for seal coating, and in the winter for spreading sand, cinders or rock salt on icy pavements.

Model DD fits any standard dump truck body and can be attached or detached in one minute. It gives a uniform spread 4 to 60 feet wide, at 1 to 35 miles per hour. *Model DD* will give you years of economical, trouble-free service.

Sold by leading distributors throughout the U.S., Canada and many foreign countries

HIGHWAY EQUIPMENT COMPANY, INC. CEDAR RAPIDS, IOWA, U. S. A.
MANUFACTURERS OF THE WORLD'S MOST COMPLETE LINE OF SPREADERS

In keeping with its tradition of setting the pace with "The Best for the Biggest," Fuller announces its new 4-FS-1440 Transmission with closely spaced ratios for use with truck-type torque converters. This new unit makes new load-and-road performance possible in heavy duty service.

Built to deliver the power from the biggest automotive diesel engines now available plus ample capacity for high torque multiplication from the most advanced torque converters, the new 4-FS-1440 puts up to 400 hp. to work efficiently and dependably.

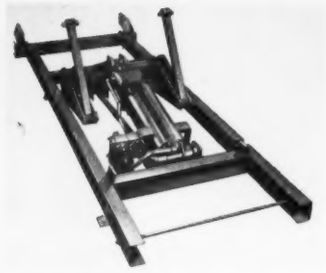
For maximum service plus maximum versatility in the toughest of heavy hauling, investigate the new 4-FS-1440. Write for performance and application data.

VITAL STATISTICS

Hp. handled—400. Speeds forward, 4: first, 1.98; second, 1.40; third, 1.00; fourth, .71. Reverse, 1.61. Weight 775 pounds.

FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO 13F, MICHIGAN

Unit Drop Forge Division, Milwaukee 1, Wis. • WESTERN DISTRICT OFFICE (SALES & SERVICE—BOTH DIVISIONS), 1060 E. 11th Street, Oakland 6, Calif.



The new St. Paul arm-type hoist.

New Arm-Type Hoist

A new line of arm-type hoists is being made by St. Paul Division, Gar Wood Industries, 2207 University Ave., S. E., Minneapolis 14, Minn. One of the main features is the elimination of the concentrated stress areas which require extra rigidity to prevent breaking or bending. A set of tension links absorbs most of the cylinder thrust and load forces.

A sliding pivot pin supports the rear of the cylinder. The tension links are connected to the pivot pin and also to the main shaft which supports the lifting arms. In the St. Paul hoists the rear forces upon the cylinder are transmitted to the rugged tension links rather than to the trunnion, as in most hoists. This makes it possible to manufacture a lighter subframe, since the stresses are not transmitted to the subframe itself.

The front of the hoist is not enclosed, but merely has a long bolt which keeps the side rails from spreading. This design permits the hoist to flex when the body sways or the chassis is distorted over rough terrain. Such a flexing motion creates high stresses in most hoists and will often crack or bend the subframe at rigid corners such as the trunnion, front cross channel, or the hinge points.

In eliminating the concentrated load points at the trunnion, the danger of bending or cracking chassis has been eliminated. Since the trunnion is located above a weak spot in the truck chassis, this is a constant fear with rigid-hoist construction.

Large bearing areas of the boss rings which support the main shaft also minimize the concentration of stresses which the tension links may pass to the subframe.

Another feature is the location of all hoist components, except the pump, above the chassis. This materially reduces installation costs. Hoist protrusions below the chassis often interfere with truck cross-member reinforcements or drive lines.

In a direct-lift hoist, where the piston rod is connected directly to the body, advancing the lifting point is achieved by increasing the angle of the cylinder. To do this the cylinder either has to be raised above the subframe, or dropped below it. St. Paul has solved this in its use of a larger rigid torque tube which supports the lifting arms and links. This unit permits use of a very slight incline of the cylinder and still retains a lifting point well forward on the body—6 inches ahead of the C/L on an 8-foot body of the H-16 hoist.

The torque tube is fabricated of sheet steel. It is as large as possible in the area permitted, thus reducing the weight of material needed for strength and rigidity. The lifting arms are welded to either side of the torque tube. When one member is under compression the other member of the arm is being stretched, giving greater strength per pound of this unit. The location and construction of these arms assure equal lift to both sides of the body.

Further information may be secured from the company. Or use the Request Card that is bound in at page 18. Circle No. 725.

Conveyor-Belt Lacing

A compact bulletin describing and listing Alligator long-length conveyor-belt lacing has been issued by Flexible Steel Lacing Co., 4607 Lexington St., Chicago 44, Ill.

It contains application views, sizes, and list prices as well as other pertinent information. These separable fasteners can be furnished in any length, with hinge pins, for joining flat conveyor belts of all widths up to 96 inches, and thicknesses up to ⅝ inch. Continuous in length, these fasteners make a smooth joint of uniform tension across the full width of the belt, the bulletin points out.

This literature may be obtained from the company, or by using the Request Card at page 18. Circle No. 737.

Dunn Assigned as Director

Lt. Col. Carroll H. Dunn is the new Director of the Army Corps of Engineers' Waterways Experiment Station at Vicksburg, Miss. He succeeds Col. Herrol J. Skidmore who will enter the Armed Forces Staff College at Norfolk, Va. Col. Dunn will assume his new duties this month when he returns from the Far East Command where he has been serving at General Headquarters since 1949.

ROAD BUILDERS—IT'S SENSATIONAL

STEEL WIRE BIG PECKERWOOD DRAG BROOMS

IT'S FRAMELESS TRADE MARK REG. NO FRAME REQUIRED

6 INCHES WIDE AND ANY LENGTH TO 12 FEET
NAME YOUR LENGTH — ASSEMBLE YOUR OWN
IN ANY SHAPE WANTED — IN MINUTES — NOT HOURS

MADE WITH KILN DRIED 6" WIDE HARDWOOD AND HEAVY GAUGE SPRING STEEL WIRES TRIPLE WIRES OUT EACH HOLE.

THIS IS IT

ILLUSTRATION OF 12-FOOT SECTION

ONLY $3.50 RUNNING FOOT

LITTLE PECKERWOOD
STANDARD UNIT SIZE
MADE TO FIT YOUR FRAME
3" Wide, 15" Length
with 2 Bolts.
Double Wires
Out Each Hole

OUR DRAGS NOT STAPLE SET. BOTH STOCK ITEMS.

THE TOUGHEST WIRE DRAG BROOMS EVER BUILT

NOW $2.50 EA.
PRICES F.O.B. K.C., MO.

VAN BRUSH MFG. CO. 327 S.W. BLVD. KANSAS CITY, MO. SINCE 1928

Lay TEN TIMES MORE PIPE

PER POUND OF MATERIAL HANDLED

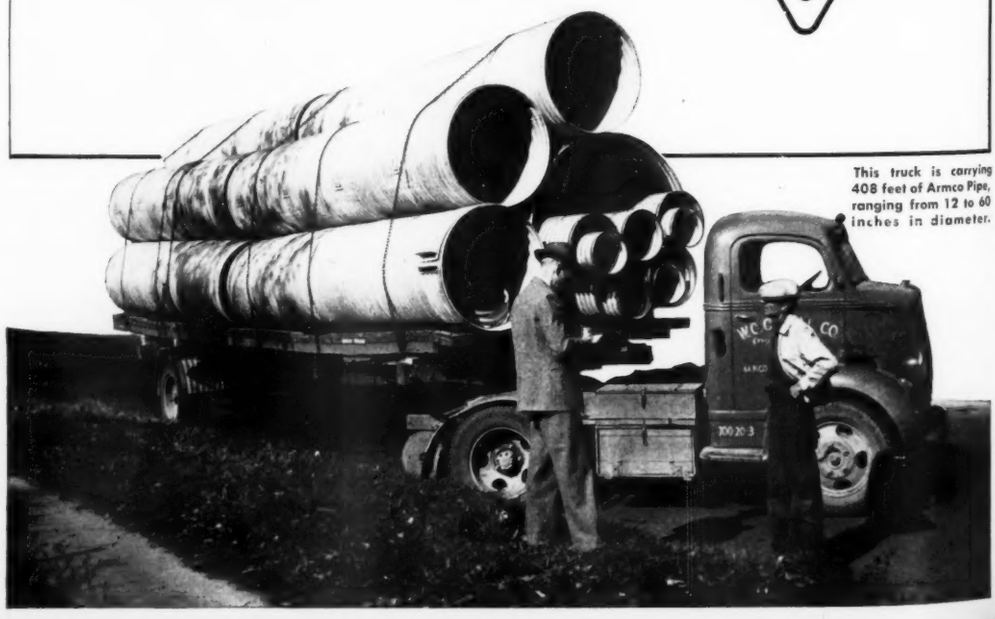
Armco Corrugated Metal Pipe is strong, yet light in weight. In contrast, rigid sectional pipe and monolithic box structures of the same capacity weigh about ten times as much. This means you can install ten times more Armco Pipe per pound of material handled.

With the high cost of today's labor and equipment, this savings in handling can be tremendous. In addition, installation goes along faster and easier. Jobs are completed ahead of schedule. This means more profit for you.

But let's get specific. Suppose you need a 15-inch diameter culvert, 40 feet long. Then you should have two 20-foot lengths of Armco Pipe, plus one coupling band. Each 20-foot length, in 16-gage, weighs 260 pounds. So the total handling weight, including coupling band, would be *only 530 pounds*—an easy, two-man task.

There is an Armco Drainage Structure to answer almost every drainage problem —in the right style, size and protective coating. Write us for recommendations. Armco Drainage & Metal Products, Inc., 4382 Curtis Street, Middletown, Ohio. Subsidiary of Armco Steel Corporation. Export: The Armco International Corporation.

ARMCO DRAINAGE STRUCTURES ARMCO



This truck is carrying 408 feet of Armco Pipe, ranging from 12 to 60 inches in diameter.

Small Bridges Close Columbia Gorge Gaps

Concrete Structures Span Streams and Union Pacific Railroad To Tie Traffic Flow Into Columbia River Highway

• IN the spectacular Columbia River gorge between The Dalles and Portland, where some of the heaviest and most difficult jobs the Oregon State Highway Department has ever let are under way, auxiliary structures of interest to small contractors are also under construction. Many of these structures will tie the 90-mile water-level express route to towns along the way, as well as to the older and more scenic road which will be left in service.

Typical of these small jobs is a $160,846 contract in the vicinity of Mosier. Parker-Johnson Co. of Portland has the Oregon State Highway Department contract, which calls for construction of the Mosier crossing of the Union Pacific Railroad tracks, and for small reinforced-concrete bridges across Mosier Creek and Rock Creek near the town. Mosier is about 70 miles east of Portland, which gives some indication of how rapidly the work is moving along up the gorge. The contracts which tie into The Dalles have been let, and it is expected that by 1954 most of the large-scale work will be finished.

Crossings Fit Master Plan

Location and design of the Mosier bridges fit a master plan which will permit traffic to move rapidly up the Oregon side of the river while drivers at the same time enjoy some of the most magnificent scenery in America. To build a water-level route reasonably free from curves and steep grades, with sight distances adequate for 70-mph operation, it was necessary for the designers to blast great cuts out of the mountainsides which meet the mighty Columbia. Fills as deep as 160 feet were planned; aerial photography was used; and dredges have worked for at least three years to build many of the long earth fills along the south bank of the Columbia River to carry the new highway or the existing Union Pacific railroad. In those cases where the railroad is moving over, the highway is being constructed on the old railroad bed.

The Mosier bridges will give traffic an accessway from the town to the new expressway over the Union Pacific tracks, and will carry the express highway itself over two small streams. All three structures are designed for H16-S20-44 truck loading.

The Mosier overcrossing is a simply designed low-cost bridge of reinforced concrete, 173 feet long. The roadway deck is 26 feet wide, curb to curb, with a pedestrian walkway on each side. Piers consist of 24-inch-square reinforced-concrete columns. They are set in bedrock except for portions out in the riverbed, which runs close to the railroad embankment all the way up and down the river.

Mosier Creek bridge is 70 feet long, and will have a 30-foot roadway. Rock Creek bridge is 120 feet long and also carries a 30-foot roadway.

Rapid Construction

Parker-Johnson's principal construction problems have been the usual ones for work of this kind. An especially heavy wooden falsework, with steel I-beams across the railroad tracks, had

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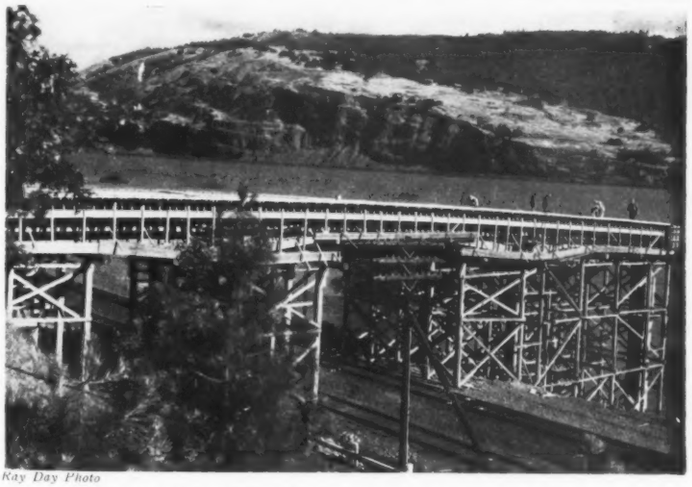
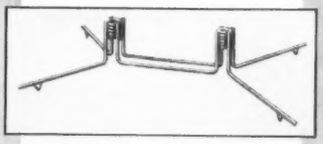


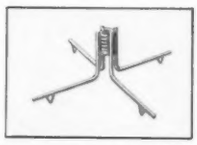
Kay Day Photo

It was a ticklish business to make the footing excavations and set the forms for the Mosier overcrossing near Portland, Oreg., because the main line of the Union Pacific Railroad runs underneath

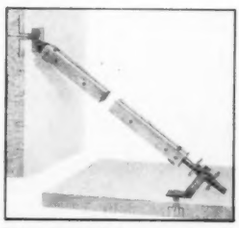
3 NEW SUPERIOR ACCESSORIES
for more efficient handling of...
"TILT-UP" SLABS



"PICK-UP" INSERT with two 1" coil bolts, will safely lift a load of 11,000 lbs. when embedded in 3,000 lb. concrete slabs.



"ANCHOR" INSERT in both the "Tilt-Up" slab and the floor slab provides anchorage for slab brace bolts.



SLAB BRACE for temporary anchorage is quickly installed and adjusted. Has exclusive pivoting action.

Are you bidding on a "Tilt-Up Slab" job? Are you starting a "Tilt-Up Slab" Job? Then you will be interested in Superior's three new accessories, designed for faster and more efficient handling of precast panels.

The Superior *"Pick-Up" Insert* provides dependable anchorage for bolts to which slings are attached when the panel is raised. *"Anchor" Inserts* in both the "Tilt-Up" slab and the floor slab secure the temporary bolts to which the braces are attached. With Superior's adjustable and pivoting *Brace* you have an efficient as well as inexpensive answer to both ordinary and unusual bracing problems . . . you merely assemble with 2 x 4's of lengths to fit individual jobs.

Leading contractors on the Pacific Coast and in the Midwest already are users of these new specially designed inserts and braces.

For details write today for Superior's Bulletin "T U-1".

SUPERIOR CONCRETE ACCESSORIES, INC.
4110 Wrightwood Avenue, Chicago 39, Illinois

New York Office
1775 Broadway, New York 19, N. Y.

Pacific Coast Plant
2100 Williams St., San Leandro, Calif.

Small Bridges Close Columbia Gorge Gaps

(Continued from preceding page)

to be designed and built. Railroads are always sensitive to blasting with dynamite in the center of the double tracks, so the footings for the main concrete pier at that point had to be gouged out rather laboriously with air guns and steel moil points. There was a problem of safety where men were working so close to a railroad, but the railroad cooperated by running its trains at slow speed through this area, and nobody has been hurt.

The falsework bents consist of 8 x 8's and 8 x 10's of Douglas fir, well bedded in the railroad bed and anchored to wooden base plates. These timbers are heavily sway-braced, and are capped with 10 x 12 Douglas-fir timbers. Stringers under the portion of the bridge not over the railroad are 6 x 18's laid with the narrow side up. Forms, which are supported on these stringers either directly or by short supports, are ordinary shiplap with nailed Masonite facing. The stringers over the railroad track consist of 30-inch steel I-beams.

Kay Day Photo

Reinforcing steel is trucked out to the Mosier overcrossing job and unloaded by brute strength and skill. Some of this steel is 1¼ inches round.

The falsework was erected in place after each piece was cut to the right dimension in a central carpenter yard. Form panels for the deck, as well as the panels for the columns, were made up in a small yard at the site, close enough for a short truck trip to take the panels to the job. Lumber is readily available in the Pacific northwest, some in good grades, so this material was trucked in as needed.

To minimize any possible delay on reinforcing steel, Parker-Johnson subcontracted the furnishing and placement of this material to Mercer Steel Co. of Portland. The steel is now arriving by truck, cut and bent for installation, and so new it is entirely free from rust. Some of the heaviest bars are 1¼ inches in diameter. Since the bridges are accessible by ramps, no special cranes are needed to unload and place this material.

The only good source of concrete in the Mosier area is a commercial plant operated by Ledbetter Concrete Co., so a materials agreement was made covering the supply of ready-mix concrete to the job. The truck mixers which haul this material back in to a small 4-yard hopper, discharge their load, and the concrete is buggied to the placing point. A small Northwest crane was used with a transfer bucket to place concrete in the piers and to set the girders in place.

Good progress is being made on these small bridges because the flow of materials to the job, the schedule of project pours and forming, and the allied phases pertaining to access agreements and so on are all well organized. The Mosier overcrossing is being built first, then will come Mosier Creek. The same methods are being used in each structure, except that steel girders will not be used in Mosier Creek and Rock Creek bridges. A small crew of 25 men is rushing the project.

In many cases, completion of these smaller projects is a very important element in the timing of work in a given area. Many of the excavation and grading plans are set up around the possibility of hauling dirt and rock over the structures.

Personnel

The three bridges at Mosier were designed and are being supervised under the general direction of R. H. Baldock, State Highway Engineer, with G. S. Paxson as Bridge Engineer and Robert W. Ellison as Resident Engineer. Gus Carlson is General Superintendent and W. E. Sonju is a bridge superintendent for Parker-Johnson Co.

Punch-Lok Hose Clamps

Last the Life of the Hose

Locked for safety, and bound to hold pressure without damage to the hose, Punch-Lok Hose Clamps will not loosen from vibration. Built for strength and permanence Punch-Lok gives you a streamlined, leakproof hose connection that lasts the life of the hose itself.

See Your Near-by Punch-Lok Distributor

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PUNCH-LOK company

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DAREX AEA
Used in more concrete construction than any other
AIR ENTRAINING AGENT
On job after job these facts have been proved: air entrained concrete with air content closely controlled through the use of DAREX AEA places easier and faster, finishes quicker, has better surface texture, is more homogeneous and more durable when exposed to freezing and thawing. Readymix concrete plants everywhere can furnish concrete made with DAREX AEA . . . or you can get the same advantages by using DAREX AEA as a gauge water addition. Ask your supplier, or write to us for helpful 20-page illustrated booklet.
CONSTRUCTION SPECIALTIES DIVISION
DEWEY and ALMY Chemical Company
Cambridge 40, Mass. • Chicago 38
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Tignes Dam, France

SpringLoad Mfg. Corp.'s new portable power pipe cutter is light in weight, adjustable in size, and adaptable to power from various sources. One model cuts 6 to 10-inch pipe, and the other, from 12 to 16 inches.

Portable Pipe Cutter

A new portable power pipe cutter which cuts and bevels steel or cast-iron pipe on the job is introduced by SpringLoad Mfg. Corp., 2412 Aurora, Seattle 9, Wash. Features of the cutter, the company claims, are its portability, light weight, adjustable size, adaptability to power from various sources, hinged construction (which permits its use on pipe already installed), and speed of cutting. The unit cuts and bevels a 10-inch steel gas pipe in approximately 10 minutes, as compared to the hours its takes to and from a lathe, or by torch. Cuts are true with a flat edge on the inner circumference, ready for immediate welding. The bevel cut is made at a 60-degree included angle, but where codes in any area require a different angle, suitable bits can be furnished.

Of the two standard models, one is for 6, 8, and 10-inch pipe inclusive, and the other for 12, 14, and 16-inch pipe inclusive. Larger sizes are custom-made. The 6 to 10-inch cutter weighs approximately 80 pounds, which makes it easy for one man to handle on the job. It can be taken apart for slipping under a pipe already in the ground, and each piece of the assembly is relatively light to handle. Power from any of several sources facilitates field use. A ¾-inch slow-speed electric drill, the equivalent in an air drill, or a flexible shaft on a small gasoline motor geared to slow speed, are all acceptable. The machine could be hand-operated where conditions made it necessary.

The power cutter is made with a cast-aluminum housing finished in SpringLoad blue enamel, with all working parts of the finest machined steel, suitable for the particular part, the company says. Sealed-race ball bearings on eccentric fittings for adjustment run in a machined track for smooth operation and true cutting. The tool automatically increases its depth of cut with every revolution, and also compensates for out-of-round pipe. It is held on the pipe with drive points which keep it firmly in position during the cutting. The replaceable cutter bits are of high-speed steel. Oiling of the cut is automatic.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 759.

Booklet on Microwave System

A 20-page booklet providing a semi-technical description of RCA microwave equipment has been issued by the RCA Victor Division, Radio Corporation of America, Point & Cooper Sts., Camden, N. J.

It contains photographs, diagrams, charts, graphs, and maps. It explains how the microwave radio works, and gives design and propagation characteristics. The booklet deals with multiplexing, telemetering, and remote-control features of microwave systems, and presents practical information as to who can use microwave, how to plan a microwave system, and selecting station sites.

This literature may be obtained from the company, or by using the Request Card that is bound in at page 18. Circle No. 772.

Packages Asphalt in Paper

How practical is it to package asphalt in paper bags for overseas shipment? The Army Engineer Research and Development Laboratory at Fort Belvoir, Va., is trying to find out.

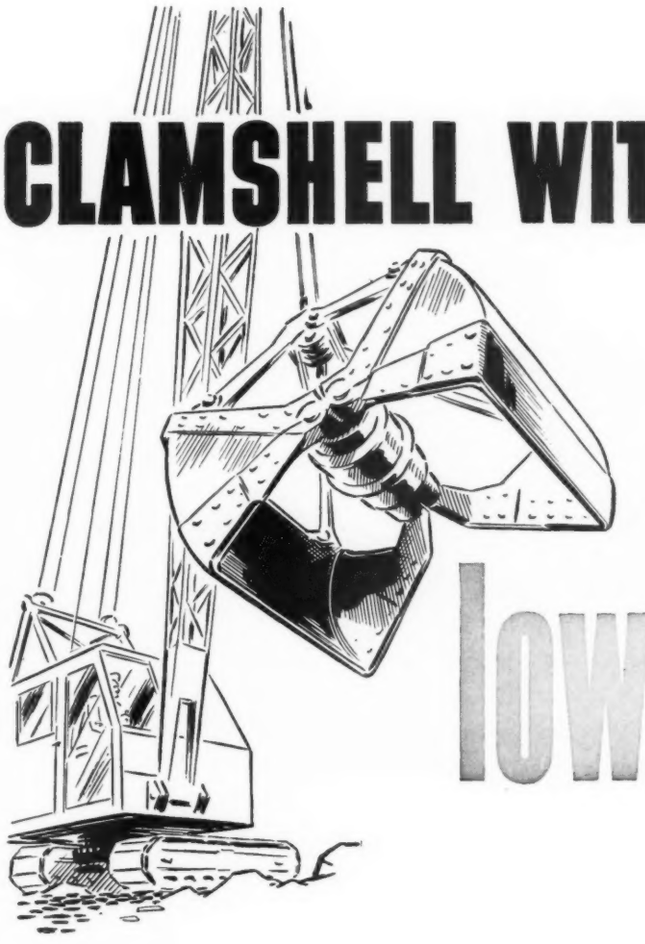
The multiwall paper bags undergoing tests in the Packaging Development Lab hold 100 pounds of asphalt. This asphalt is heated to pouring consistency and loaded into the bags in liquid form through a hose. The bags, lined with a clay coating, are placed in wooden scaffolds to help them retain their shape. After loading, they stand for 24 hours to allow the asphalt to cool and harden. On arrival, the bag is merely cut with a sharp knife, and the paper stripped off.

The lab has experimented with exposure, handling, and storage tests in temperatures from 65 degrees below to 165 degrees above zero. Though not perfected as yet, the bags show promise and if they meet the stiff military requirements, will provide a packaging medium that is an alternate for the standard metal drum.

The automatic exhaust pipe cover. Sizes available to fit from 1" to 6-3/16" exhausts, O. D.

WEATHERCAP provides positive year 'round protection for all engines with vertical exhaust pipes: compressors, road pavers, mixers, crushers, generators, etc. Fully automatic—opens and closes instantly by means of engine exhaust. Seals out rain, snow, dirt, insects . . . prevents flooded pistons, cracked cylinder heads, rusted or warped valves. Quality-built of heavy gauge steel with balanced fins made to uniform specifications conforming to engine exhaust pressures. Low in cost — years of service. Immediate delivery. Write today for full particulars and prices.

ANTHES FORCE OILER CO., AVE. M AT 20TH ST., FT. MADISON, IOWA



CLAMSHELL WITH stiff lower lips

Rock-picking packs a tough wallop for a pair of bucket lips. Whether the load is sludge or tight-grained granite, abrasion alone is enough to wear thin the toughest steel . . .

. . . But — when you throw in the almost continuous impact when the clam is in the hands of a high-grade operator — bucket lips are sure to curl back and quit . . .

. . . Unless you have taken the precaution to protect the life of your buckets — up to twice as long as the unprotected type — with one of the many Airco Hardfacing Alloys available to extend the life of all your equipment.

'Face' it. There are more than twenty Airco Hardfacing Alloys for you to choose from. Any Airco representative will be glad to give you complete information. Contact your nearest Airco Office today.

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DEALERS AND OFFICES IN PRINCIPAL CITIES

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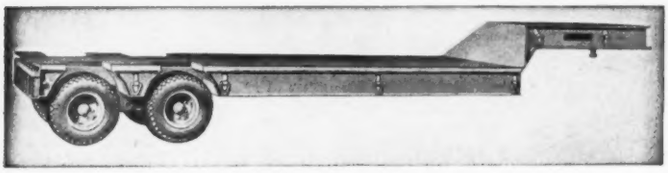
SOLVE YOUR HAULING PROBLEMS WITH
A "TRANSPORT TRAILER"
Capacities through 75 Ton—Semi and Full Trailers



CARGO CARRIER MODEL GPX (Semi) with Tandem Axles

PATENTED TANDEM AXLE ASSEMBLY—Featuring unusual lengthwise and sidewise wheel accommodation to irregularities in the road. Use of full width tubular forged, heat treated axles with CAMBER.

FRAME—Constructed of beam sections throughout, electric welded. A ruggedly strong and efficient unit with minimum weight.

TRANSPORT TRAILERS, INC.
TRANSPORTATION ENGINEERING A SPECIALTY
CEDAR RAPIDS, IOWA, U.S.A.

Trailer-Type Mixer

Increased horsepower and a cam-operated skip shaker are features of the Model 6-SE trailer-type concrete mixer announced by the Knickerbocker Co., 654 Liberty St., Jackson, Mich.

The end-discharge one-bag unit now uses a 2-cylinder air-cooled engine developing 10 hp at 2,000 rpm, compared to 8 hp for the single-cylinder engine used on the old model. This 25 per cent boost is largely due to an increase in the piston displacement from 38.5 cubic inches to 45.9 cubic inches.

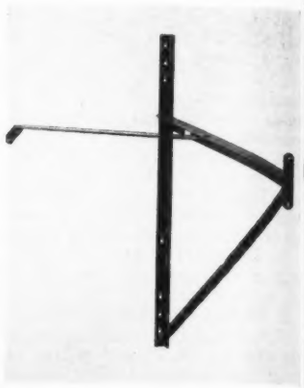
In addition, the new mixer incorporates a cam-operated skip shaker and a tongue and legs that fold completely out of the way for shipment. The company claims that the Model 6-SE mixer retains the steepest skip angle of any mixer having a full 60-degree angle in the discharge position.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 709.

Horsepower has been increased and a skip shaker incorporated in the new Knickerbocker concrete mixer.

Carpenter's Bracket

A lightweight and portable folding bracket for carpenters has been announced by Wilson-Albrecht Co., Inc., 3565 Wooddale Ave., Minneapolis 16, Minn.



The 4-piece riveted Waco bracket folds down to a 2 x 48-inch package, making it easy to transport and store. Constructed of heavy-gage angle iron, the unit allows for a 36-inch ledger and is used on sheeting, stuccoing, siding, and shingling jobs. The Waco bracket weighs 12½ pounds.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 779.

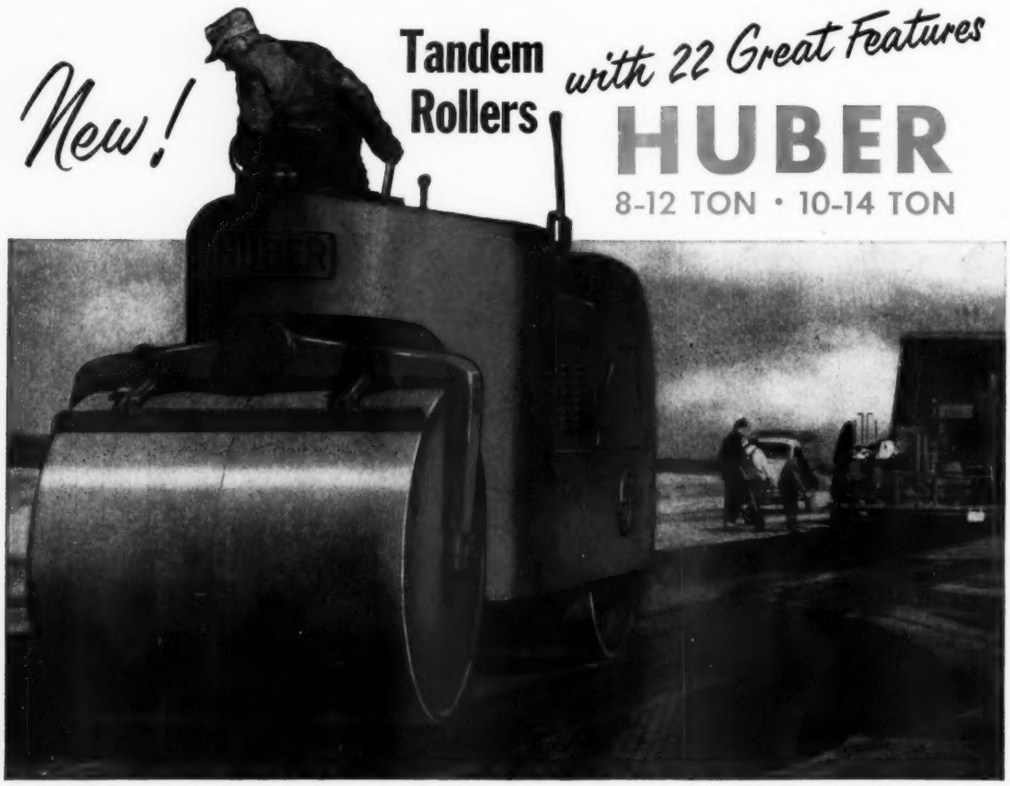
Stevens Installment Plan

The Stevens Institute of Technology, Hoboken, N. J., has a "Pay-As-You-Go" plan, whereby the student pays his annual college expenses in 12 monthly installments. "The encouraging thing," says Dr. Jess H. Davis, President of the engineering college, "is the number of banks that have asked about the plan" . . . saying "that they have been considering for some time various forms of low-interest loans for college students." Two cooperating metropolitan banks are making it possible for the plan to be carried on at Stevens. These banks advance immediately to the college the full tuition costs; this advance meets the needs of the school and, at the same time, helps students who get a full year to repay the bank.

Dr. Davis believes that some requests for further information about the plan may be due to the "Korean Veterans' " bill. Under this new legislation, instead of the money for the student-veteran being paid directly to the college, monthly payments for tuition are made to the veteran himself. Since most colleges ask that bills be paid in advance, it is necessary now to find a means of accommodating veterans who are not able to pay the advance out of savings.

The advantage of the plan is that loan funds seldom cover expenses for a full four-year course, while outside sources generally charge interest rates far higher than the four per cent yearly rate required by Stevens.

New! Tandem Rollers with 22 Great Features
HUBER
8-12 TON • 10-14 TON



Here's a new HUBER Tandem Roller that offers new standards of performance in terms of speed, dependability, smooth operation and long life.

Make up a check list of every feature you'd like to see in a tandem roller—and see for yourself how HUBER has anticipated your needs. More than a score of major and minor refinements are incorporated in its design and construction.

Such features as permanent bearing alignment in the kingpin and swivel pin assemblies, the wrap-around frame that gives you a new concept of rigidity, and HUBER's perfected version of fluid coupling are among the improvements that will catch your interest.

The best way to get the whole story is to see one of the new HUBER tandems in action. Second best is to write for a copy of the new HUBER TANDEM ROLLER BULLETIN, No. T-152. Send for your copy today, or see your nearest HUBER Distributor.

This 16-page bulletin, T-152, tells the story of the new HUBER Tandem Rollers in pictures and descriptive copy. Ask for your copy—address requests to Huber Manufacturing Co., Marion, Ohio.

HUBER MANUFACTURING CO. • Marion, Ohio, U. S. A.
Manufacturers of Huber Maintainers, Graders and Complete Line of Rollers

HUBER

Quick Nozzle Puller

A new puller for removing the fuel-injection nozzle from the cylinder head on all International Harvester diesel engines is available from Owatonna Tool Co., 381 N. Cedar St., Owatonna, Minn.

The tool is said to be fast and efficient; to exert a straight powerful pull; and to do the job in a matter of minutes. It is adjustable and may be used for other pulling jobs as well.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 797.

New Gulf Freeway Completed

Despite the national trend toward toll roads, Texas motorists are traveling the "free" way. Last month, when the 50-mile Gulf Freeway was opened to traffic between Houston and Galveston, a 9-mile section begun in 1946 had already carried 252,000,000 vehicle miles of traffic.

At the official dedication, Governor Allan Shivers and E. H. Thornton, Chairman of the Texas Highway Commission, led motorcades from each end of the concrete superhighway to the midpoint. Following the ceremony there, the official party went to Galveston for a fireworks display and the crowning of "Miss Texas".

The $28,643,000 Gulf Freeway is the longest toll-free superhighway built since World War II.

Pacific Bridge Co., San Francisco, contractor for riprap work on the face of Grand Coulee Dam, collects rock with a 2¼-yard Link-Belt shovel which loads into a 36TD Euclid dump truck. The shovel is powered by a 275-hp NHS-600 Cummins diesel torque-converter unit, and the "Euc" by a 300-hp NHBS-600.

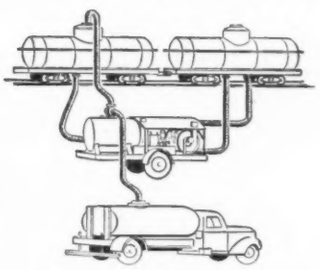
Only the Cleaver-Brooks "Deuce" gives you this DUAL-DUTY performance in one operation

HERE'S the answer to fast, low-cost heating of pumpable bituminous material—in one compact mobile unit, easily moved to location with one motor truck. Heats and transfers bitumen 4 times as fast through the direct oil-fired pumping booster.

In addition, you have a fast steaming, economically operating tank car heater. A combination unit that offers substantial savings as compared to purchase of two separate units.

Over 10 h.p. 125 lb. W.P. oil-fired, four-pass, horizontal fire tube boiler — ASME code constructed and so stamped, conforming to all State and Local Codes, equipped with condensate system mounted together with direct fired pumping booster on single sturdy frame — skid mounted or 2-wheel trailer mounted. Write for further information.

CLEAVER-BROOKS COMPANY, Dept. L-396 E. Keefe Ave., Milwaukee 12, Wis.



1. Steam preheat to pumpable consistency
2. Circulate and Heat to application temperature
3. Pump and load distributor

Not one, not two, but three jobs can be done with the Cleaver-Brooks "Deuce" a Combination Tank Car Heater and Pumping Booster. You can steam preheat one car to pumpable consistency while you are circulating and heating a second car to application temperatures. And, with this same unit you can then pump and load the distributor or transfer truck.

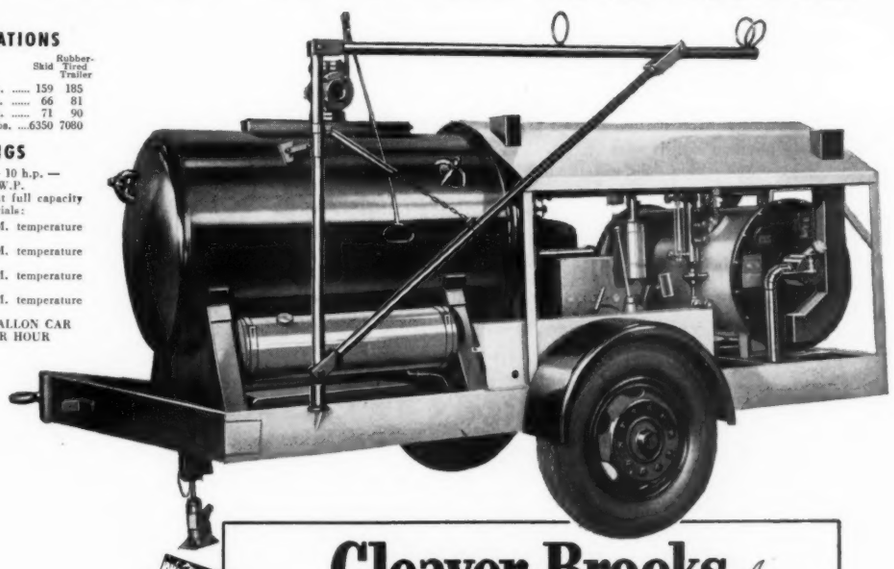
☆ A Portable Steam Boiler ☆ A Direct-Fired Heater ☆ IN ONE MOBILE UNIT

SPECIFICATIONS

	Skid	Rubber-Tired Trailer
Over-all length, in.	159	185
Over-all width, in.	66	81
Over-all height, in.	71	90
Shipping weight, lbs. 6350		7060

RATINGS

Steam Boiler — 10 h.p. — 125 lbs. W.P.
Operating burner at full capacity and pumping materials:
Approx. 300 G.P.M. temperature rise 25-35°F.
Approx. 180 G.P.M. temperature rise 45-55°F.
Approx. 100 G.P.M. temperature rise 85-95°F.
Approx. 50 G.P.M. temperature rise 170-180°F.
HEATS 10,000 GALLON CAR 35-45° F., PER HOUR



Send for the Cleaver-Brooks "Deuce" Catalog.

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BUILT BY THE PIONEERS AND ORIGINATORS OF TANK-CAR HEATERS. BITUMINOUS BOOSTERS

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IOWA—James W. Bell Co., Inc., 1720 1 Ave., N.E., Cedar Rapids; 2818 Fifth Ave., Des Moines 13.
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LOUISIANA—Frank P. Fischer Engineering Co., 7924 Maple St., New Orleans 18.
MAINE—Parker-Danner Co., Riverside Drive, Augusta.
MASSACHUSETTS—Parker-Danner Co., 25 Factory St., Hyde Park 36; 71 Needham St., Newton Highlands.
MICHIGAN—Eddy & Co., 1377 E. 8 Mile Rd., Detroit 20; 2500 S. Pennsylvania Ave., Lansing 4; Straits Engineering Co., 400-2 Ashmun St., Sault Ste. Marie.
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NEW YORK—Syracuse Supply Co., 76 Wall St., Binghamton; 2080 Military Rd., Buffalo 17; R. E. Brooks Co., 50 Church St. New York; Syracuse Supply Co., Portville Rd., Olean; Van's Equipment Sales, Inc., Routes 9 and 20, Rensselaer; 1349 University Ave., Rochester; Syracuse Supply Co., 294 Ainsley Drive, Syracuse.
NORTH CAROLINA—North Carolina Equipment Co., P. O. Box 3066, Asheville; P. O. Box 1265, Charlotte; P. O. Box 128, Guilford; P. O. Box 655, Wilmington; 3101 Hillsboro St., Raleigh.
NORTH DAKOTA—Northwestern Equipment, Inc., 715 11th St., Bismarck; 901 Eighth St., Devils Lake; P. O. Box 110, Dickinson; P. O. Box 152, Fargo; P. O. Box 335, Minot; P. O. Box 626, Wahpeton.
NEVADA—Sierra Machinery Co., 307 Morrill Ave., Reno.
OHIO—The W. W. Williams Co., 914 Main St., Cincinnati; 18301 Brookpark Rd., Cleveland 11; 835 W. Goodale Blvd., Columbus; 1260 Conant St., Maumee.
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OREGON—Howard-Cooper Corp., Highway 99E, P. O. Box 433, Albany; Highway 99, P. O. Box 86, Central Point, P. O. Box 1, Coquille; First and Van Buren, Eugene; 5821 N. E. Glisan St., Portland 13; 225 E. 2nd Ave., S. Roseburg.
PENNSYLVANIA—The Capitol Equipment Co., 5100 Paxton St., Harrisburg; Alan A. Wood, 1649 N. Broad St., 905 Hardt Bldg., Philadelphia; Drave-Doyle Co., 2601 Preble Ave., N.S., Pittsburgh 12.
RHODE ISLAND—Parker-Danner Co., 139 Allens Ave., Providence.
SOUTH CAROLINA—South Carolina Equipment Co., 444 Gadsden St., Columbia.
SOUTH DAKOTA—Sioux Road Equipment Co., 500 E. Sixth St., Sioux Falls; Box 941, Rapid City.
TENNESSEE—Wilson-Weesner-Wilkinson Co., 202 W. Morelia Ave., Knoxville; Tri-State Equipment Co., 124 E. Calhoun Ave., Memphis; Wilson-Weesner-Wilkinson Co., 310 S. 2nd St., Nashville.
TEXAS—Alamo Iron Works, Brownsville; Corpus Christi; Tri-State Equipment Co., 500 E. Overland St., El Paso; Conley-Lott-Nichols Machinery Co., 1311-19 S. Ervay St., Dallas 1; Conley-Lott-Nichols Company, 3601 Avenue "H," Lubbock; Tri-State Equipment Co., P. O. Box 472, Odessa; Alamo Iron Works, Santa Clara & Montana Sts., San Antonio 6.
UTAH—Kimball Equipment Co., 222 W. 17th St., S., Salt Lake City 10.
VIRGINIA—Hampton Roads Tractor & Equipment Co., W. 39th St. and Killam Ave., Norfolk; Natural Asphalt Corp. of Virginia, 1901 Hamilton St., Richmond.
WASHINGTON—Glenn Carrington & Co., 91 Columbia St., Seattle 4; Howard-Cooper Corp., 5045-55 - 4th Ave., S., Seattle 8; Intermountain Equipment Co., 611 E. Sprague, Spokane.
WEST VIRGINIA—West Virginia Tractor & Eq. Co., P. O. Box 473, Charleston; P. O. Box 367, Clarksburg.
WISCONSIN—The Stone Manufacturing Co., 321 N. 25th St., Milwaukee 3; Badger Equipment Sales, Inc., Route 2, Thiensville.
WYOMING—Studer Tractor & Equipment Co., East Yellowstone Highway, Casper.
ALASKA—Glenn Carrington & Co., c/o Westward Hotel, Anchorage.
CANADA—Mussens Canada, Ltd., Church St., New Brunswick, Fredericton; Coleman Machinery Co., Ltd., 101 Upper Water St., Nova Scotia, Halifax; Mussens Canada, Ltd., 63 Colborne St., Montreal 3; Ontario Equipment & Supply, Ltd., 111 Merton St., Toronto, Ontario; Frost Machinery Co., Ltd., 971 Erin St., Winnepeg, Manitoba; International Agencies & Machinery Co., 2315 Cambie St., Vancouver, B. C.; Mussens Canada, Ltd., Charest Blvd., Quebec.

Unit Guides Pipeline Under Swift Waterway

Keeping track of a pipeline as it moved under and across the swift-moving New York Narrows required precision measurement. Transcontinental Gas Pipe Line Corp., Newark, N. J., who recently completed the 1,840-mile Texas-to-New York line, used a Raytheon Fathometer to guide the huge pipe along the riverbed trench.

The actual laying of the 1¼-mile line weighing 1,600 tons was done with a shore device and an offshore float. The pipe was joined on shore and pulled out over a series of rotating truck tires into the water. A 180-hp diesel on the opposite bank, with a line force of 425,000 pounds, pulled the pipe after each new section was joined. To keep the pipe below the moving ships and above the 25-foot-deep trench, pontoons with a special release mechanism were lashed to the top.

As the pipe moved across, the Fathometer's chart showed the points where it was going out of line. In this way crews could be sent to the exact position to guide the pipe back into position. When the line was anchored on both sides, the pontoons were released and the pipe's great weight settled it into the trench.

Further information on the Fathometer may be secured from Raytheon Mfg. Co., Waltham 54, Mass. Or use the Request Card bound in at page 18. Circle No. 796.

Folder on Crusher Repair

A new folder just released by Stulz-Sickles Co., 134 Lafayette St., Newark 5, N. J., tells how to save time and money by rebuilding and repairing various types of crushers with Manganal, a manganese-nickel steel. It illustrates how roll crushers, jaw crushers, and corrugated, smooth, and concave gyratory crushers can be entirely rebuilt and repaired with Manganal bar or special Tite-Kote electrodes and Manganal round applicator bars.

As regards low spots on roll crushers, the folder explains how this expensive equipment can be salvaged through the use of the rebuilding process offered by Manganal. It also depicts how build-up welding time on hammermill hammers may be practically eliminated. Procedure details on how to weld Manganal round applicator bars onto the different types of illustrated crushers are also included.

This literature may be obtained from the company, or by using the Request Card at page 18. Circle No. 784.

Reduction of driver fatigue is a feature of the new Baltimore-Washington Expressway. The 113-foot-wide center strip, preserving natural contours, trees, and shrubbery, relieves monotony and reduces headlight glare at night. A glimpse of the northbound lane is shown in the circle at left—both are 24-foot-wide BC lanes.

2 ways to make crane operations pay more

Rud-O-Matic Magnet Reel Tagline Combination

Steel tagline holds magnet steady and absorbs the load . . . protective slack is maintained in expensive magnet cable to avoid jerking, pulling loose at the terminals or snagging.

Standard with major crane manufacturers, made in five sizes for your present equipment.

Rud-O-Matic Tagline

steadies your clamshell buckets. Provides ample coil spring power at all boom angles to keep bucket lined up with the work. Makes more loads per day easier. Rud-O-Matics are foolproof, trouble-free. Eight sizes meet all requirements. Available immediately. *For full information see your dealer—or mail coupon below.*

I'd like more information on ☐ Rud-O-Matic Taglines, ☐ Rud-O-Matic Magnet Reel-Tagline Combinations. Send literature and complete details.

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McCAFFREY-RUDDOCK Tagline CORPORATION

2131 East 25th Street • Los Angeles 58, California

RIP-RAPPING with 32 Ton Stones

*Morrison-Knudsen Co. Contractors—Boise, Idaho

An *exclusive* Owen Grapple feature contributed greatly to the speed, safety and success in placing thousands of tons of rip-rap to protect the down stream banks at Grand Coulee Dam.

The granite stones varied from 12 tons to 32 tons and no two were similar in shape.

Because of its Patented independent tine action the Owen Grapple alone could grasp such difficult objects with pressure exerted equally through all 4 tines regardless of the irreggular shapes of the stones.

If you use grapples, investigate this exclusive Owen feature which speeds operations, increases safety and lowers per ton handling costs.

"A mouthful at every bite"

BUCKETS AND GRAPPLES

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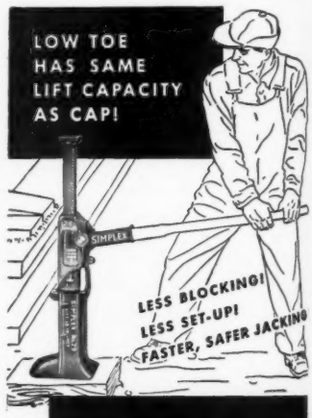
6030 Breakwater Avenue • Cleveland, Ohio

Branches: New York, Philadelphia, Chicago, Berkeley, Calif.

GET 19" LIFT from 2½" CLEARANCE!



SIMPLEX RATCHET LOWERING JACKS

Lift or Lower the Load Notch by Notch—cannot be Tripped.

With Simplex Ratchet Lowering Jacks minimum toe clearance is necessary. Loads are usually lifted from the ground to the toe of the jack by pinch bars or wedges. Only Simplex Jacks provide equal lift capacity on toe or cap. No other jacks offer such a combination of low cost and all-purpose utility. In fast jacking action—extra-safety features—and rugged strength for longer life, Simplex Ratchet Lowering Jacks give you more for your money! Available in capacities of 1½ to 35 tons. Write today for Bulletin: Industrial 49.

SAFETY SUGGESTION—Use thin wood block—Don't lift or lower steel against steel.

Simplex LEVER • SCREW • HYDRAULIC Jacks

TEMPLETON, KENLY & CO.

1002 South Central Avenue • Chicago 44, Illinois

Give Generously to the Red Cross

Know Your Blasting Hazards, Even Freaks

Lightning, Radio, Stray Currents, And Static Electricity Are Unusual Hazards but Serious Nevertheless

• TODAY the use of explosives on construction jobs is common. Knowledge of the characteristics and the proper use of explosives, however, is not as common as might be desired, according to James A. Shaw, Editor of the Safety News letter put out by the Construction Section of the National Safety Council. Part of this may be due to the fact that new developments in explosives and blasting techniques are occurring every day. It is important that these new ideas be brought to light and thoroughly understood by the men doing the blasting. Proof that instruction is needed is shown by the several serious blasting injuries which happen each year.

Among the many types of blasting hazards are four unusual ones, which, though all the conditions have to be just right, can definitely cause premature detonation of electric blasting caps. These are lightning, radio, static electricity, and stray currents.

Lightning

It is known that a direct lightning strike on a blasting circuit will cause detonation. But what many foremen are unaware of is that a near miss or even a lightning strike several miles away can detonate blasting circuits. Several methods have been devised which are supposed to render electric blasting caps insensitive to lightning, but none of these are foolproof. Also, some authorities feel that the minimum safe distance between an electrical storm and a circuit using electric caps is five miles. But even this radius is fallible.

What is definite is that anything that conducts electricity, such as fences, power lines, and water, will increase the probability of detonation. Also, in determining a level of static produced by an electric storm, remember that audible thunder is about seven miles away. When a lightning flash is seen and the thunder following can be heard distinctly—beware! The limit of safety is approaching rapidly.

Radio

There is an increasing use of portable radio transmitters on construction jobs. Frequently police, amateur, and commercial broadcasting transmitters are also near the sites. Though the conditions have to be just right, radio waves can explode electric blasting caps. The hazard is created, however, by the transmitting, not the receiving set. The wires for the caps act as an antenna to pick up the radio waves, and there is a definite ratio between the length of these wires and the transmitted wave length.

The amount of radio frequency current varies directly with the power of the transmitter and inversely with the distance from the transmitter. For example, a transmitter of 50,000 watts would have a danger area of 10,000 feet, whereas a 30-watt transmitter would have a danger area of only 30 feet.

The Council suggests that when blasting is to be done in an area where there is danger from permanent radio transmitter, a type of cap other than electric be used for detonation. Where portable transmitters are located, it is recommended that the use of the transmitter be controlled.

Static Electricity

Static electricity, another detonator of electric blasting caps, is generated by many sources on construction jobs. These may be moving belts, escaping steam, open electrical connections, revolving automobile tires, and even dust storms in open country.

Common sense can control these hazards. Moving machinery should be adequately grounded near blasting operations, and wires should be kept away from piping, rails, and other wiring that might convey charges. During severe dust storms, blasting should be stopped altogether.

Stray Currents

The hazard of stray currents is common in tunnel work, especially around pipelines, rails, armored cables, and ventilating ducts. There is also a possibility of currents in the ground from poor power-line insulation. Frequent tests should be made with suitable instruments for determining the presence or absence of such currents in tunnel work or any other operations where currents may be involved.

Further and more detailed information on the use of explosives and the hazards involved may be gained either from the National Safety Council or from most explosive-supplying companies. The average foreman on a construction job cannot be expected to be an expert on all types of unusual hazards. Therefore if there is the possibility of lightning, radio, static electricity, or stray current interference on a job, advice should be sought immediately. The number of accidents which are occurring from these unusual hazards is changing them from "freaks" to everyday possibilities.

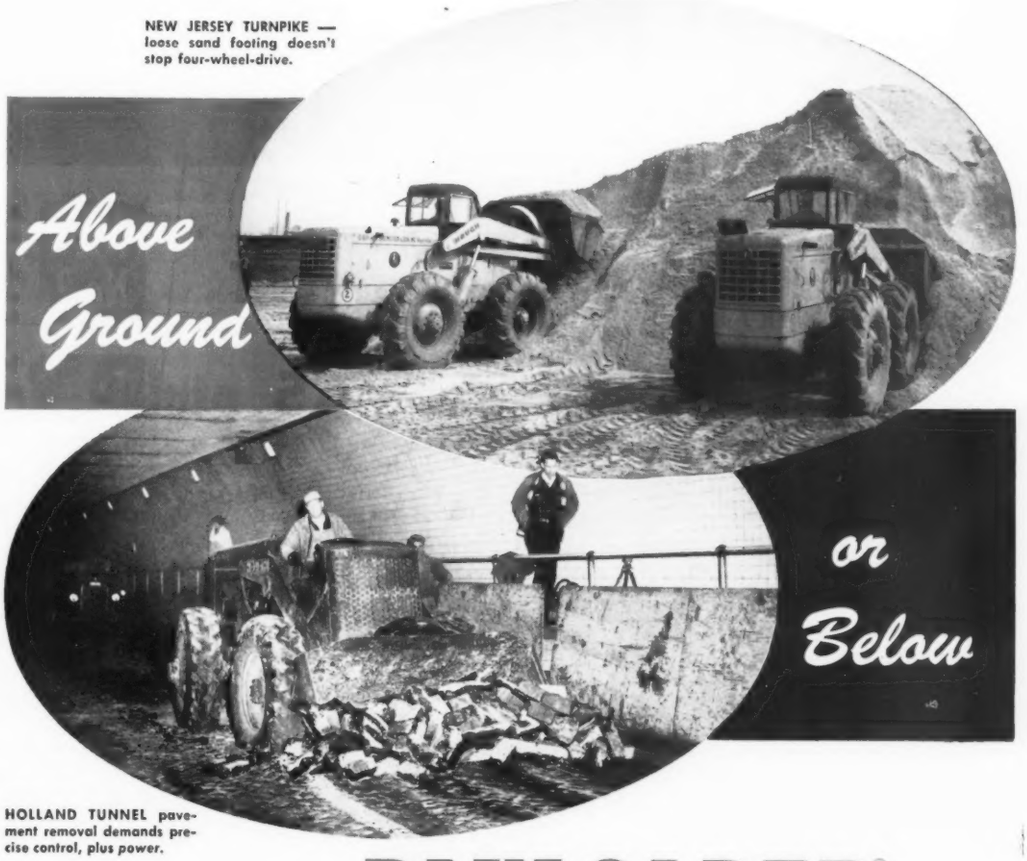
Vapor Steam Cleaner

A new steam cleaner for motor trucks, tractors, crawlers, bulldozers, and all types of road-building equipment has been developed by the Aeroil Products, Wesley St., South Hackensack, N. J. The Auto-Steam is especially designed for the cleaning of motors, chassis, wheels, and bodies. It is also said to be effective in flushing out fuel-oil trucks.

The vapor steam cleaner can be controlled by one man from a completely visible panel. The company claims that it can be operated at 50 cents an hour. One filling of the compound tank is sufficient for eight hours of continuous operation. Many chemicals may be used without any premixing being required.

The Auto-Steam is said to generate 100 pounds of steam pressure in 90 seconds. Working parts are readily accessible for servicing. The flash-type boiler has continuous tubular pancake sections which can be removed for inspection. The cleaner has a ½-hp motor. It has a 120-gph capacity and a 75 to 110-pound working pressure. Its atomizing burner is sootless. The cleaner has a naval bronze rotary water pump which automatically stops when the water supply fails. It is available in several models, the designs adapted to the type of service required.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 760.



NEW JERSEY TURNPIKE — loose sand footing doesn't stop four-wheel-drive.

HOLLAND TUNNEL pavement removal demands precise control, plus power.

PAYLOADER®

Versatility Pays Off

WHETHER on the New Jersey Turnpike construction or Holland Tunnel repaving, the combination of four-wheel-drive, large pneumatic tires and *power* of this big, compact 1½-yd. "PAYLOADER" tractor-shovel pays off. It has fast-action traction on all kinds of footing — crawler-like traction at far less maintenance expense — PLUS speed when you want it. It has *versatility* to work on sand, mud, snow or clay and to travel over streets and highways at 16 mph.

This "PAYLOADER" also gives you easy operation and maneuvering speed with power-boosted steering and four speeds in reverse as well as forward . . . and is available with gasoline *or* diesel power. Hundreds of contractors are enthusiastic owners and boosters and once you've seen an HM in action you'll understand why. You'll find them on all kinds of construction projects from turnpikes to tunnels. The Frank G. Hough Co., 762 Sunnyside Ave., Libertyville, Illinois.

WRITE for full information on the Model HM or other "PAYLOADERS." There are seven sizes from 12 cu. ft. to 1½ cu. yd. capacity.

SAY "HUFF"

PAYLOADER®

THE FRANK G. HOUGH CO. · Since 1920

Portrait in Print

By RAY DAY

Integrity, Skill Count With Byrne

• THIRTEEN floors above Seventh and Main Streets, in the new Fort Worth National Bank Building, a telephone rang in the suite of offices occupied by the construction and engineering firm of Thos. S. Byrne, Inc. When Thos. S. Byrne answered it, a voice at the other end of the line said, "Well Tom, we're definitely going ahead with the new building, and you're going to build it for us. In due time we'll select the architect."

Byrne, a ruddy-faced, conservative, friendly man, smiled slightly and expressed his thanks. Though to Tom Byrne the business of being selected to build Fort Worth's major buildings, sometimes before even the architect is picked, is not new, it is always satisfying. It means that a lifelong effort on his part to instill skill and integrity into his organization has, once again, borne fruit.

From his 13th-floor offices in one of his newest buildings, Byrne can look out over his Texas range. His range consists of brick, steel, and concrete buildings scattered over Fort Worth's skyline: buildings like the Montgomery Ward mail-order retail store, Fort Worth Star-Telegram newspaper, radio, and television plants, the Fine Arts Building at Texas Christian University, and store buildings of W. C. Stripling Co., H. L. Green Co., Grant's and Leonard Bros. Two of his latest buildings, the Administration Building and the American Airlines hangar, are nearing completion at Fort Worth's new International Airport, midway between that city and Dallas. Byrne is strictly a Fort Worth man, but portions of Camps Barkley, Hood, and Swift (done in conjunction with other contractors) stand in tribute to his firm's contribution during World War II.

Typifies Integrity

It has been said of Byrne, by people who know him well, "When the good Lord made him, He lost the pattern." What these people mean is that he is a type of man not often seen today in American construction and business circles.

Believing in the joy of work, in the satisfaction of work well done, and in moderation in all things, Byrne is a symbol of the conservative serious-minded part of the South. A Texan by birth and education, he is also a graduate in architectural engineering at Massachusetts Institute of Technology, and did his share of engineering work in staid old Boston in his early years. Whatever it was about this combination gradually developed the present philosophy of his firm. Today there is not a business in Texas more conservative and middle-of-the-road in its policies—or more reliable.

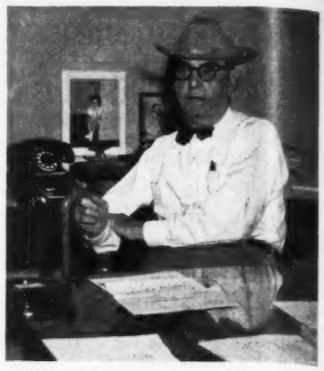
As an indication of the firm's reliability, about 90 per cent of its jobs are let by the owners on a cost-plus basis. Byrne is a staunch personal defender of the cost-plus system, and maintains that this system, operated honestly on the basis of integrity, efficiency, and mutual understanding, cannot be equaled by any system of bids.

"It gives the owner and the contractor the flexibility both need in this day when conditions change by the hour", he explains.

Byrne has pretty well proved his point, too. Firms like W. C. Stripling Co. and the Fort Worth Star-Telegram have called on his firm consistently to do their building and other construction work. When General Motors recently started construction of its mammoth assembly plant near Arlington, Texas, it was the Byrne building sign which was hoisted over the job. This, however, was a routine bid arrangement.

It has been the gradual shift to unpredictable things in the building industry which has caused Byrne, more than ever, to champion a system based on skill and integrity. The ever-increasing importance of mechanical engineering in a modern building has introduced variables of supply to the business. The recent steel strike, with its terrific impact on the building construction industry and the people who work in it, is another example of things beyond a contractor's or owner's control. Byrne is a mildly profane man conversationally, and if he is asked his opinion about the steel strike, he can give it bluntly. He charges that one up to a straight political attack on big private enterprise, and he says the so-called "little man", who was supposed to benefit, turned out to be the one who was hurt most.

Yet Byrne can turn from broad national problems and from his position of Chairman of the Board of his company, to the typical small problems of a building contractor. The night before the notes for this article were taken, two surveying instruments had been stolen from one of the jobs. Byrne knew every detail, and he was just as angry about it as if he were the superintendent or nightwatchman himself.



High above the busy streets of Fort Worth, Texas, Thomas S. Byrne takes time out for an interview. His office is in the Fort Worth National Bank Building, constructed last year by his own firm, Thos. S. Byrne, Inc.

Varied Background

Byrne has the kind of background which is theoretically perfect for his business. Born February 20, 1891, in Austin, Texas, Byrne attended high school there and then went for 4 years to the University of Texas. Following

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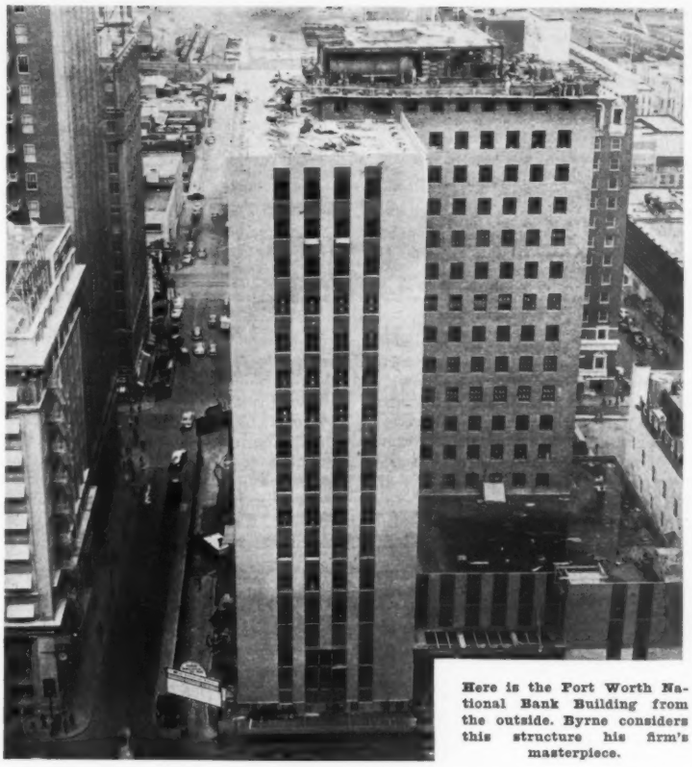
that, he majored in architectural engineering at M. I. T., graduating in 1913.

His first job was with Monks and Johnson, a Boston engineering firm, where he stayed for about a year and a half until the outbreak of war in Europe forced a layoff. Byrne used the layoff as a good excuse to come back to Texas, where he worked for Mosher Steel Co. and the old W. C. Hedrick Construction Co. until 1916. Wyatt Hedrick, one of the best known architects in the nation today, and Byrne are close friends and have been associated on many projects.

Byrne's first taste of really big construction came after he joined the U. S. Army Ordnance Department in 1916 and was placed on the construction of Nitrate Plant No. 1 at Sheffield, Ala. When that was finished, he moved to Plant No. 3 at Toledo, Ohio. Released from the army in 1919, he returned to Fort Worth to take charge of Hedrick's office as Vice President and General Manager of Operations in the Fort Worth area.

In the belief that he could derive the most personal satisfaction from his own business, Byrne made the necessary plans and struck out on his own in 1922. How well he succeeded in his policy of good organization, skill, and integrity is illustrated by the fact that six years later, in 1928, his firm was selected to build the Montgomery Ward building at the then staggering figure of $1,300,000. The building was completed in good shape, and it seemed that things were starting to roll.

But the depression came, and the 4-year period from 1929-1933 was bad for the firm—no one was building anything big. Good management and a sound financial footing, however, gave the firm enough small jobs to squeeze through. By 1936, things moved again, and the company was on its way to a position of leadership as a Fort Worth building firm.



Here is the Fort Worth National Bank Building from the outside. Byrne considers this structure his firm's masterpiece.

Some of the men who weathered that period with Byrne are with him now. H. H. Franks, President of the company, has been with Byrne over 25 years, as has John L. Anderson, Secretary-Treasurer. Ellis R. Brown, 1st Vice-President, is a 5-year man, and Frank Sherwood, 2nd Vice-President, has been with the firm 4 years. Sherwood is only 25 years old and illustrates Byrne's faith in young blood.

Byrne, a bachelor, has arranged in his firm a participation by the main officers so that they and his immediate family—a sister and nephew—will continue to have and run the firm in case anything happens to him. A mild stroke last year failed to dim his enthusiasm for his work, and Byrne will often visit one or more of his jobs even though the temperature is over 100. Air conditioning is fine in some of the modern buildings his firm does, but Byrne himself can stand the Texas heat as well as anybody.

In an effort to give a part of himself to his community, Byrne is a Director on the Board of the Fort Worth Chamber of Commerce and a member of the Exchange Club, an exclusive group of civic leaders. He also belongs to the Fort Worth Club and the River Crest Country Club.

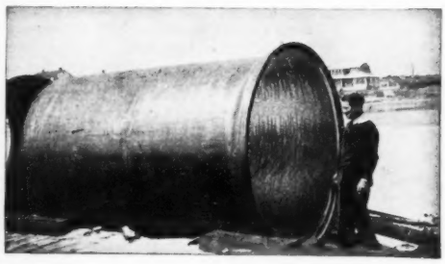
The fun part of Byrne's life is typically simple and wholesome. He loves to fish and to hunt quail and deer in central Texas. He admits enjoying "just a little bit of poker once in a while". People who have joined him at such sessions say that he is equally tough with four of a kind or a bluffing hand. He plays both of them with equal skill.

Advice: Stand on Your Own Feet

Byrne is not the kind of man who gives advice at random or considers himself all-important. But he is anxious for more young men to adopt the few sound rules he himself has learned with the passing years. They are the

(*Concluded on next page*)

This is worth looking into



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Integrity and Skill Count with Byrne

(*Continued from preceding page*)

old-fashioned and sound virtues of work, skill, honesty, good character, and understanding of mutual problems. A young man just graduated from an engineering school will do much to bring about a satisfying future if he will only cultivate a friendly attitude toward work and people, Byrne believes. In talking to him, one gets nothing of the popular emphasis on leisure time, recreation, and something for nothing. As a matter of fact, Byrne is willing to be counted on that score. He is leading, along with other serious and prominent Texans, the "I Like Ike" move. What Byrne would like to see is some kind of return to normal acceptance of personal problems by individuals, and a gradual return of government closer to home.

All his life, Byrne has watched how work and integrity succeed for the individual and for a business firm. He now has the satisfaction of knowing that this lifelong policy will remain an integral part of his firm. To the young man reading this, Byrne regrets that he cannot offer some easy method for getting to the top in a hurry.

"It takes hard work and the most rigid kind of personal honesty", Byrne says. "Nothing else will work."

Secretary-Treasurer John L. Anderson, Byrne, and President H. H. Franks. All veteran company officials, they weathered a depression and the start of a business, and can contemplate the past with much personal satisfaction.

Sealed Lamp Holder

A weatherproof lamp holder has been developed by Stonco Electric Products Co., 333 Monroe Ave., Kenilworth, N. J. It makes use of a high-temperature silicon rubber cushion seal that hugs the neck of the lamp in a tight weatherproof seal that is reported to withstand great heat and adverse weather conditions. By sealing the lamp low at its neck and by exposing its hot-spot area to open air cooling, lamps are reported to burn more coolly and longer than they normally would in rated life testing. At the same time, the cushion-seal adapts itself to fit all R-40 and Par-38 lamps whether long, short, or off-center. By cradling the lamp in a rubber cushion grip, the cushion seal helps protect the lamp against traffic vibration, pole sway, shock, and other conditions contributing to early lamp failure.

The new unit is made of noncorrosive cast aluminum with a glazed porcelain heatproof socket. The silicon cushion seal is backed with an impregnated asbestos heat barrier and locked in place by a rigid aluminum reinforcing disk. The unit comes completely wired with lead wires extending beyond a universally adjustable swivel arm that is threaded ½ inch IPS for mounting to ½-inch pipe, wall bracket, pipe slip fitter, or any of a number of standard interchangeable splice-box accessories. It carries UL and CSA approval for use with medium-base or mogul reflector lamps in the standard 150W, 200W, 300W, and 500W sizes now made by all major lamp manufacturers.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 728.

Soil-Conservation Awards

Goodyear Tire & Rubber Co., Akron, Ohio, has named the 70 grand-award winners in its fifth annual program of soil-conservation awards, conducted between July 1, 1951, and June 30, 1952. The winners, representing nine states in which the contest was held, were selected by their state judging committees.

The states are: Arkansas, Kansas, Louisiana, Montana, Nebraska, North Dakota, Oklahoma, South Dakota, and Wyoming. Each state, with the exception of North Dakota, is represented by eight winners—five members of the state's outstanding soil-conservation district governing body for the contest period, and three farmer-rancher cooperators whose contributions to the district's achievement were greatest during the year. North Dakota, with three elected members on each district governing body, is represented by a total of six winners.

The winners will be guests at statewide recognition luncheons held in their honor during the fall and will be presented with individual bronze plaques. In December they will be the guests of Goodyear on a vacation trip to Wigwam guest ranch at Goodyear Farms in Litchfield Park, Ariz.

B-K Names General Manager

George L. Dirks has been appointed General Manager of the Blaw-Knox Division of Blaw-Knox Co., Pittsburgh, Pa., in succession to D. V. Sherlock, who has retired. Mr. Dirks comes to the company with a background of 25 years' experience in production engineering and industrial management. The Division, located in Blawnox, Pa., operates a large fabricating plant which makes specialized equipment for the construction industry.

McKIERNAN-TERRY PILE HAMMERS

help keep Florida bridge project ahead of schedule

The Diamond Construction Co. of Washington, D. C., contractor for the new Gilmore St. Bridge over the St. Johns River at Jacksonville, Fla., had to sink pre-assembled frames and then drive piling to form cofferdams for pier foundations in 63 feet of water. Powerful McKiernan-Terry equipment helped keep this job ahead of schedule.

All H-beam bearing piles in this structure were driven with a McKiernan-Terry Double-Acting 11-B-3 steam hammer. For driving the steel sheet piling the contractor switched to a McKiernan-Terry Double-Acting 10-B-3 hammer, then used a McKiernan-Terry Double-Acting E-4 Extractor to pull the sheet piling.

This teamwork is typical of the way McKiernan-Terry equipment has helped to speed many thousands of construction jobs. There are 16 sizes of McKiernan-Terry hammers and 2 sizes of McKiernan-Terry extractors for every specific need. Write for bulletin describing complete line.

A McKiernan-Terry Pile Hammer punches down piling to form cofferdams for new Florida bridge, which will be another link in U. S. Highway 1. The bridge is located at Gilmore St. over the St. Johns River at Jacksonville, Fla. The designers are Reynolds, Smith and Hills of Jacksonville, Fla. C. L. Lash is Resident Engineer. B. E. Crumrine is Job Supt. for Diamond Construction Co.

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Avoid Legal Pitfalls

Edited by A. L. H. STREET, Attorney-at-Law

These brief extracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Bond Did Not Cover Compensation Award

THE PROBLEM: *A contractor's employee on a Federal job could not collect workmen's compensation for an accident, because the contractor was insolvent and had let compensation insurance lapse. Could the employee collect under the contractor's bond to pay "all persons supplying labor" on the job where the accident occurred?*

THE ANSWER: No. (United States v. Harman, 192 Fed. 2d 999, decided by the United States Court of Appeals, Fourth Circuit.)

The bond was given on a Federal job, under the Miller Act. The court reasoned that the statutory requirement for such a bond clearly indicates that the surety's obligation is limited to payment for labor and materials furnished in performance of a job.

The court cited a decision rendered by the Court of Appeals for the Sixth Circuit, regarding the death of an employee on a bonded contract job (18 Fed. 2d 203). In that case, similar provisions of a former statute did not render the surety liable for damages.

The court also noted that, despite a decision to the contrary by a Federal judge in Montana (26 Fed. Supp. 681), most courts agree that a contractor's bond to pay for labor does not render the surety liable for workmen's compensation premiums.

The court distinguished a case decided by the South Carolina Supreme Court (178 S. E. 342) where a road contractor's bond secured payment of all debts pertaining to the work, and "all liabilities for injuries which have been incurred in and about said construction".

The court reasoned that the Miller Act was intended "to provide, for those supplying labor and materials for government construction, protection equivalent to that furnished in the case of private construction by mechanics and materialmen's liens."

Oral Promise to Pay Debt Of Another Is Not Binding

THE PROBLEM: *In Virginia, as in most if not all other states, there is a statute to the effect that an oral promise to pay a third person's debt is not legally binding. But the rule does not apply where credit is extended in the first instance to the third party for something furnished the third party.*

The prime contractor on a Government construction job sublet excavating, grading, and concrete work. The subcontractor lacked necessary equipment and plaintiff was unwilling to lease it to him without the prime contractor's guarantee of payment. A telephone call purportedly from that contractor's representative confirmed the subcontractor's assurance to plaintiff that the contractor would pay. Could plaintiff hold the contractor liable as guarantor?

THE ANSWER: No. (Lawson v. States Construction Co., 69 S. E. 2d 450, decided by the Virginia Supreme Court of Appeals.)

The subcontractor's assurance to plaintiff that the prime contractor would pay was not binding on the latter. And there was no proof that the telephone call came from the contractor; it could have been from the subcontractor's office.

The rental was charged on plaintiff's books to the subcontractor, with a note that the contractor guaranteed payment. That was strong, although not conclusive, evidence tending to show that plaintiff regarded the subcontractor as the primary debtor. All the bills were made out to the subcontractor.

Mule Caused Accident

THE PROBLEM: *A mule used on airport construction escaped from the contractor's corral because it wasn't sufficiently fenced in. At night the mule suddenly came into the path of an automobile on an adjacent highway, and the motorist was injured in the accident. Was the contractor liable for damages?*

THE ANSWER: Yes. (Raziano v. T. J. James & Co., 57 So. 2d 251, decided by the Louisiana Court of Appeal, Orleans.) The decision was influenced by the fact that there was a local ordinance against permitting livestock to run at large on highways. The court reasoned that the accident was foreseeable because of the heavy travel on the highway.

Grading Delays Paving

THE PROBLEM: *An airport-paving contractor was delayed by the grading contractor's lack of cooperation in completing the grading. Could he excuse his delay in paving, and so exonerate his liability for it, if he did nothing to compel prompt grading?*

THE ANSWER: No. (DuBois Construction Corp. v. United States, 98 Fed. Supp. 590, decided by the United States Court of Claims.)

The court noted that under the grading contract that contractor could have been assessed per diem damages for delaying the paving contractor beyond a fixed time.

Liable for Concealed Subsurface Conditions

THE PROBLEMS: *Contrary to the plans for a state bridge, the subsurface of a creek bed consisted of soft and free-flowing mud and silt, incapable of bearing rock or earth fill. This condition was shown by the state's borings, which were omitted from the plans and not drawn to the contractor's attention. (1) Because there were only two weeks within which the bidders could make marine subsurface exploration, was the contractor excused for not making it before bidding? (2) Was the contractor entitled to compensation for increased costs, due to the conditions discovered, and damages for delays resulting from the engineers slowing the work to determine how it should proceed?*

THE ANSWERS: Yes. (A. E. Ottaviano, Inc., v. State of New York, 110 N. Y. Supp. 2d 90, decided by the New York Court of Claims.)

The court also decided: The con-

(Continued on next page, Col. 3)

Eight decades ago 70% of all gainful workers in the U. S. A. toiled in agriculture. Today farms and factories, put together, account for less than 40%.

Where do the rest serve? Chiefly in distribution, which includes the physical movement of products to buyers, and all forms of selling, advertising and sales promotion at the manufacturing, wholesale and retail levels, as well as the widely varied services related to the maintenance and use of American products.

With over 60% of our total labor force falling outside of farm and factory employment, obviously salesmen on the front line of selling contribute greatly to the productivity, prosperity and the world's highest standard of living enjoyed by the U. S. A.

Without sales a business fails and jobs vanish. No matter how good a product may be, it must be sold in competition with other goods. A salesman sometimes finds his products not truly competitive. He then exercises tremendous pressures on his employer for better products, lower prices, or both. Thus, competitive selling greatly influences the progress of American prosperity.

Countries where selling is inefficient, restricted or eliminated generate far less wealth, happiness and security.

Competition, especially competitive selling, is a great American Freedom. Let us preserve it to assure Progress For All Our People.

• • •

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THE COMPETITIVE SYSTEM DELIVERS THE MOST TO THE GREATEST NUMBER OF PEOPLE

Lull Personnel Changes

Three recent appointments in Lull Mfg. Co., Minneapolis, Minn., are as follows: Charles Strauch, formerly Advertising Manager, is now Sales Promotion Manager; David Hansen has joined the company as Assistant Sales Manager; and Frank Larkin as West Coast District Representative. Mr. Larkin's territory covers California, Nevada, Arizona, Utah, Idaho, Oregon, Washington, Montana, Wyoming, Colorado; and in Canada, British Columbia, and Alberta.

Lull equipment includes Shoveloaders, tilting-tower Universal loaders, 4-wheel-drive Tractor-Shoveloaders, and fluid-driven sweepers.

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1/2" x 8" Double bevel curved	1/2" x 6" flat, double bevel
1/2" x 8" Single bevel curved	5/8" x 6" flat, double bevel
	1/2" x 8" flat, square edge

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Avoid Legal Pitfalls

(Continued from preceding page)

tractor was entitled to payment as an extra for the cost of driving test piles to determine the depth of rock formation. In computing extra compensation, the engineers were bound to use a method that would as fully as possible compensate the contractor for the actual quantity of mud and silt removed.

Surety Waived Delay In Filing Sub's Claim

THE PROBLEM: *Under a New Hampshire statute, the subcontractors of a public-building contractor were bound to file their claims with the Secretary of State within a 90-day limit, in order to hold the contractor's surety liable. Filing of the subcontractors' claims involved a delay of two weeks beyond the 90-day period. Did the surety waive this delay by filing a claim for reimbursement in bankruptcy proceedings against the contractor?*

THE ANSWER: Yes. (Therrien v. Maryland Casualty Co., 84 Atl. 2d 179, decided by the New Hampshire Supreme Court.)

The subcontractors conceded that there was a failure to file their claims in time, but relied upon the surety's subsequent conduct as indicating intention to waive the delay. The court said that the surety did not waive its rights by merely writing a letter to secure information about the subcontractors' claims, and promising to investigate them and report further. But the surety could be regarded as having waived its objection by seeking, in the bankruptcy proceedings, reimbursement of its liability on the subcontractors' claims.

Clearing Contract Breached

THE PROBLEM: *A prime contractor agreed to clear wooded growth at $69.40 per acre from an airport site covering 259.2 acres. He sublet 227.32 acres at $58 per acre. The subcontractor failed to do the work satisfactorily and the prime contractor took over. An award of $2,752.91 was based on the cost to the prime contractor of completing the sublet work, although his profit on the 227.32 acres would have been only $2,591.44 had the sub not broken his agreement. Was this award proper?*

THE ANSWER: Yes. (Horn v. Bowers, 67 S. E. 2d 737, decided by the West Virginia Supreme Court of Appeals.)

The court admitted that under ordinary circumstances the damages would have been limited to the profit that the prime contractor would have made had the sub not broken his contract, but that special circumstances of the case made the larger award proper.

But the court said that, except as it showed the profit the prime contractor would have made on the subcontract had it been fulfilled, the terms of the prime contract had no bearing on the case.

Gravel Contract Was Binding

THE PROBLEM: *A landowner agreed in writing to sell sand and gravel from her land. A consideration of $1 was*

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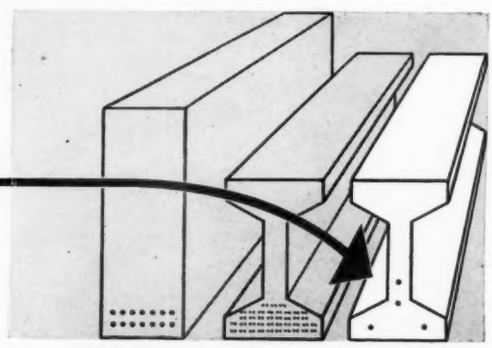

	Conventional reinforcement	Prestressing wires	STRESSTEEL bars
Steel:	14—1" diam. bars	78—0.196" diam. wires	4—1" diam. STRESSTEEL bars
Concrete:	910 lbs./foot	258 lbs./foot	258 lbs./foot

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Prestressing with STRESSTEEL, as compared with wire prestressing systems, *results in labor savings often great enough to pay for the prestressing material itself.* STRESSTEEL tensioning units may be placed, stressed and anchored with only 25 to 45 man hours per ton, as against 130 to 150 man hours per ton of high carbon wire.

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Stressteel

stated in the contract as having been received, and the buyer agreed to pay for material removed at specified yardage rates. No time was specified for removal, and the buyer was permitted to cancel the contract at will, paying only for material removed. Was the owner entitled to cancel the contract on the ground that there was insufficient consideration and that there was no mutual obligation?

THE ANSWER: No. (Mooney v. Gantt, 243 S. W. 2d 9, decided by the Arkansas Supreme Court.)

The court said that the contract implied obligation on the buyer's part to remove sand and gravel, and he had diligently and continuously done so, and paid the agreed royalty.

Irresponsible Bidders: Past Contract Defaults

THE PROBLEM: *A statute required a contract to be let to the lowest responsible bidder. A county board received the lowest bid on a bridge from a company which had furnished defective material as subcontractor for another bridge for the same county. Was the board bound to accept the bid?*

THE ANSWER: No. (Board of Commissioners v. Davis, 141 Pac. 555, decided by the Kansas Supreme Court.)

Although this case was decided in 1914, it is very likely that many, if not most, courts would follow the same reasoning: Faithful performance of contracts, as well as pecuniary resources and ability, is essential to responsibility. The county's previous loss justified the board in doubting the bidder's responsibility. It was important, too, that the board acted on its own knowledge bearing upon the bidder's responsibility, and not upon what it had heard concerning his performance in dealing with other bodies. And, finally, the question was not whether the court could find on evidence offered that the bidder was responsible, but whether the board, "acting fairly and reasonably, reached the contrary conclusion".

Opening of Road Did Not Imply Acceptance of Work

THE PROBLEM: *A state road-repair contract provided for opening portions of the road as the engineer found them "acceptable for travel". Motorists were injured in a collision that resulted from insufficient warning that a temporarily narrowed road merged into a wider road. Was there such acceptance of the work as relieved the contractor from liability because the engineer had opened the narrowed road to travel?*

THE ANSWER: No. (O'Brien v. Musfeldt, 102 N. E. 2d 173, decided by the Illinois Appellate Court.)

The decision was based upon the facts that the section of road opened to travel had not been completed because shoulder and finishing work had not been done, and that the contract specifically provided that such opening should not be regarded as an acceptance of the roadway or waiver of any provision of the contract or specifications.

Scope of Hoist Regulation

THE PROBLEM: *The Baltimore Building Code provides: "No person shall be permitted to ride on a builder's hoist." If "person" includes a contractor's employee, does the clause apply to an employee riding a crane in the lowering of a head frame which forms a part of a hoist being constructed?*

THE ANSWER: No. (State v. City of Baltimore, 86 Atl. 2d 618, decided by the Maryland Court of Appeals.)

The court said that the provision was apparently intended to apply only to riding on a completed hoist. The question arose in a suit involving injury to an employee, due to neglect of a crane operator to set a safety pawl with which the crane was equipped.

Obligation to Surety Was Limited in Scope

THE PROBLEM: *A surety on a contractor's performance bonds also agreed to advance funds to the contractor to facilitate performance. The contractor agreed to indemnify the surety against loss. Did this agreement extend to losses resulting from the surety's own wrongdoing, if any, such as failure to advance funds?*

THE ANSWER: No. (W. C. Shepherd Co. v. Royal Indemnity Co., 192 Fed. 2d 704, decided by the United States Court of Appeals, Fifth Circuit.)

License Not Necessary

THE PROBLEM: *A California law requiring contractors to be licensed exempted those engaged in construction incidental to farming, dairying, etc. Did that exempt a contractor engaged in constructing an irrigation pipeline to be used solely for agricultural purposes?*

THE ANSWER: Yes. (Kelly v. Hill, 230 Pac. 2d 864, decided by the California District Court of Appeal, Fourth District.)

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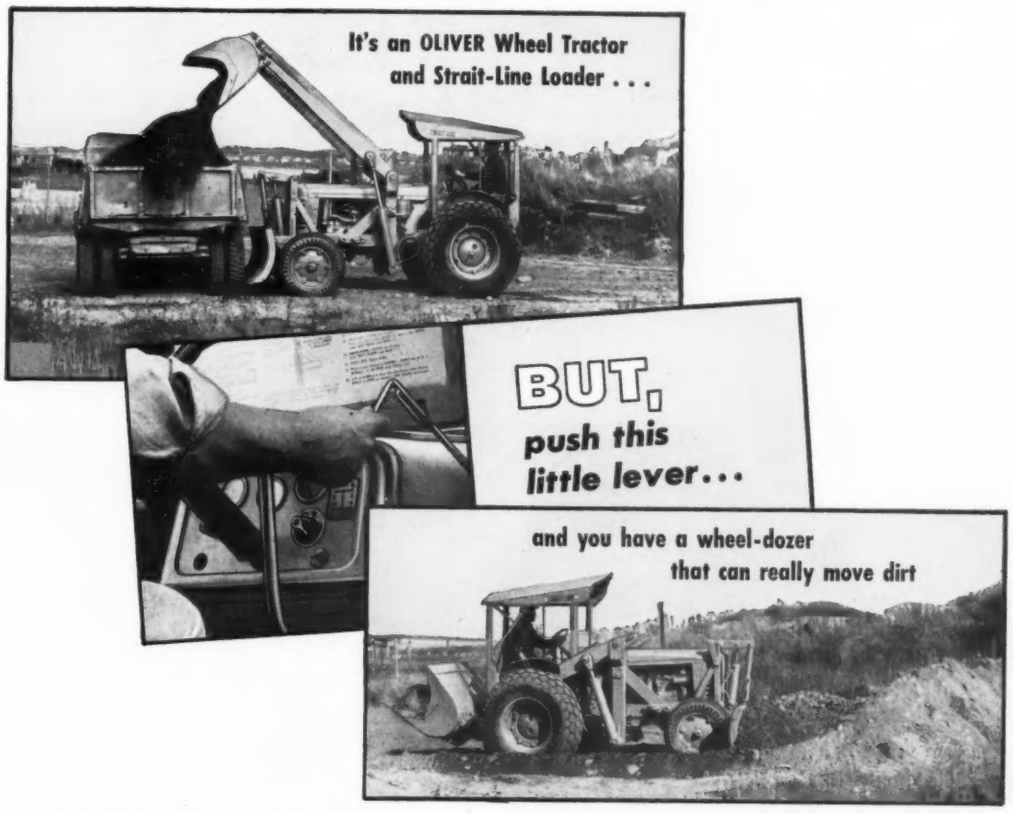
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BUT, push this little lever . . .
and you have a wheel-dozer that can really move dirt

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For informative literature see your Oliver Industrial Distributor or mail the coupon.

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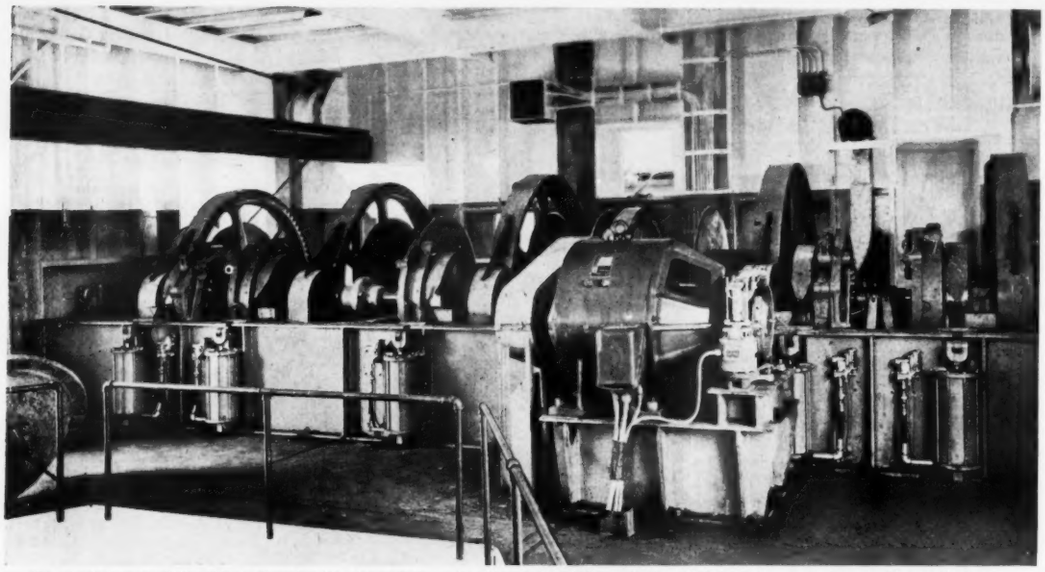
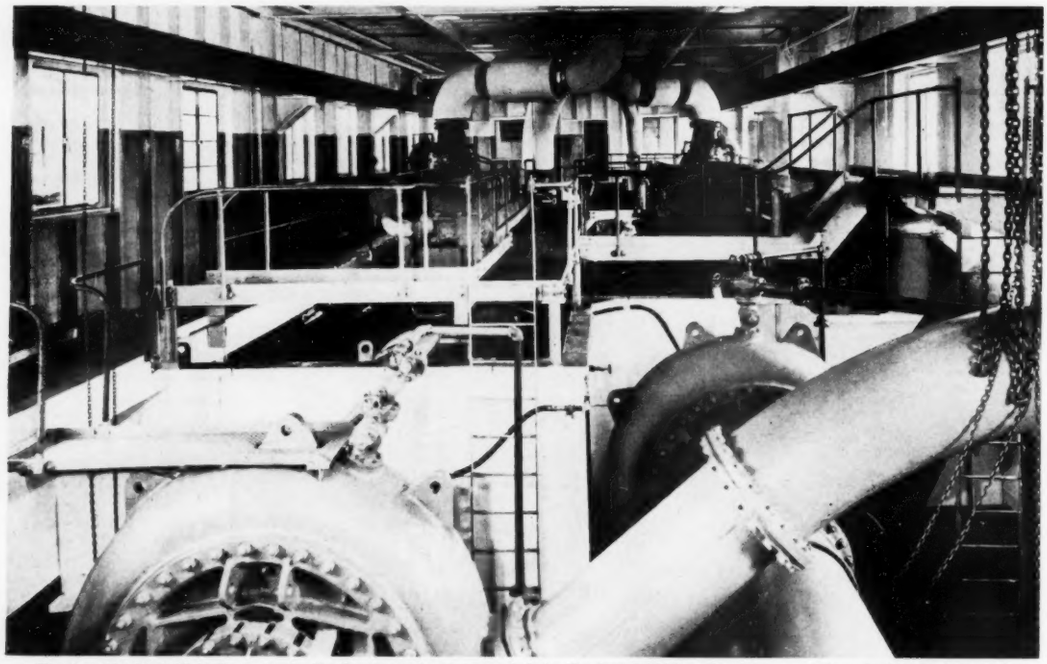


The deck house of the Musi, showing the large 5-drum hauling and hoisting winch, driving motor, and air-operating cylinders.



The two identical 22-inch pumps in the foreground are connected to the two 1,320-hp diesel-pump engines in the background.

The Dredge Musi Wends Her Way to Indonesia

Twin-Pump Hydraulic Pipeline Unit To Operate 24 Hours a Day on Harbor and Sanitation Project

• THE Republic of Indonesia, formerly the Dutch East Indies, recently acquired one of the most modern hydraulic pipeline dredges afloat. The 22-inch Musi, named for a river in Sumatra, was built by Ellicott Machine Corp., Baltimore, Md., and is the largest of nine made by this firm for Indonesia. The improvement of the harbor system in Indonesia is the immediate job the dredges have to do, and many of the smaller ones are already at work in harbors and navigational canals throughout the Republic, while some are being used for maintenance and extension of smaller canals for irrigation and drainage. The Musi's first job is to be in the Djakarta-Tandjong Priok area, and she will be put to work as soon as she arrives.

Equipped for 24-Hour Operation

The Musi is equipped for 24-hour operation. Her complete living quarters, including a modern galley, two mess halls, refrigerating equipment, and a recreation room, represent generous accommodations for a crew of 32 men, on three shifts. Only 9 men, however, will be aboard her during the 11,000-mile voyage to Indonesia via Gibraltar-Suez-Ceylon. A powerful seagoing tug is towing the Musi, whose special bow-shaped hull and fashioned bulwark plate astern are designed to facilitate towing.

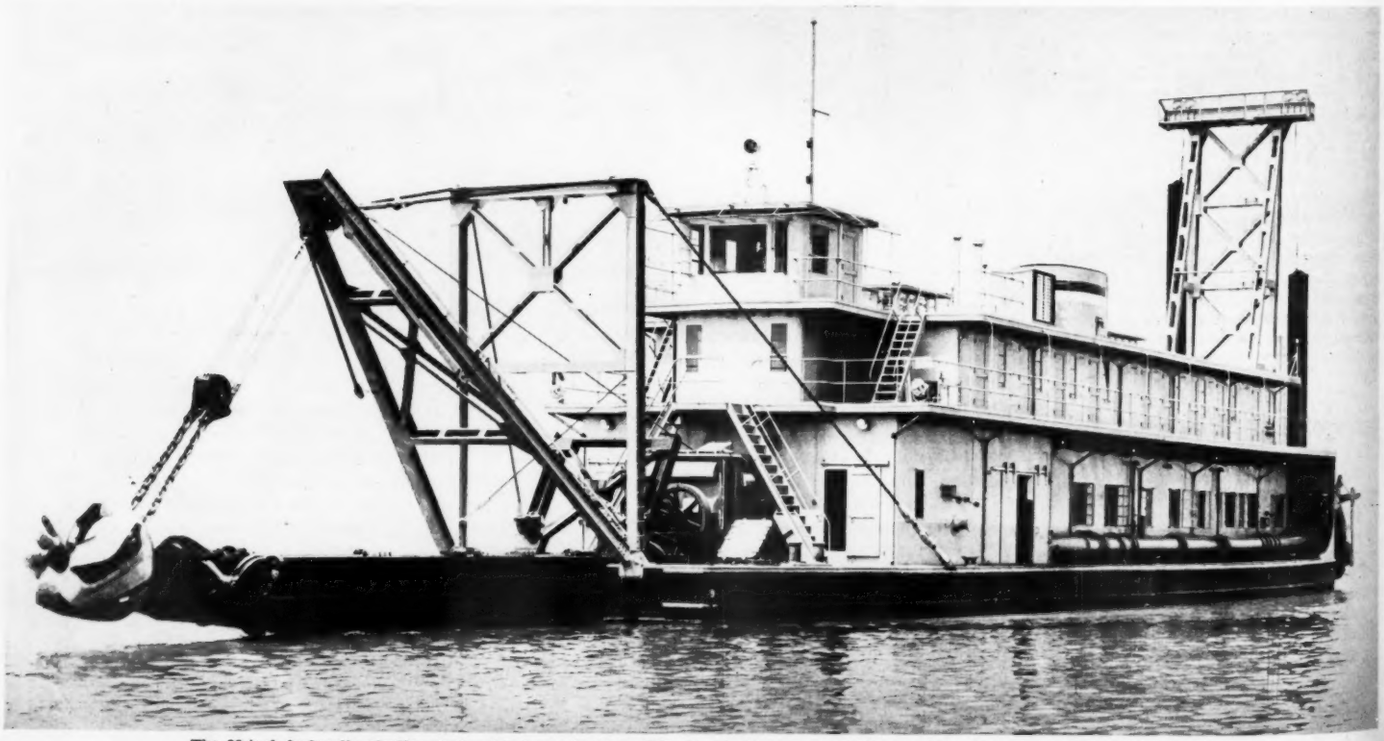
The Musi's technical specifications are as follows:

Type: Hydraulic pipeline dredge with rotating cutter for digging the material.
Rated output: 650 cubic yards of solid material per hour.
Maximum dredging depth: 39.4 feet below water.
Maximum discharge distance: 8,200 feet from dredge to disposal point.
Length: 160 feet over-all.
Beam: 40 feet.
Draft: 7½ feet.
Displacement: 1,200 long tons.
Total horsepower: Approximately 3,500.
Crew accommodations: 32 men.

Engineering Features

The inside diameters of the Musi's suction pipe and discharge pipe re-

(Concluded on next page)



The 22-inch hydraulic pipeline dredge Musi was built by Ellicott Machine Corp., Baltimore, Md., for the republic of Indonesia.

spectively are 24 and 22 inches. An unusual feature is two identical pumping units, each consisting of a 1,320-hp diesel engine directly connected to a suction-discharge dredging pump, which together have a rated output of 650 cubic yards of solid material per hour at a maximum dredging depth of 39.4 feet below water. Pumps are arranged, and piping is provided, so that they may be used in series for long pipeline operations, or individually for shorter operations. Provision has also been made to operate the two pumps in parallel where a very high output of light material is required through a comparatively short pipeline. Auxiliaries are electric-motor-driven and current is supplied by a diesel-electric generating system of about 500-kw rating. This brings the total horsepower of the dredge to approximately 3,500.

Sanitation Projects

While harbor improvement, with consequent better handling of raw materials for export, is the first use to which Indonesia's new dredges are being put, a second and extremely important program is that of sanitation improvement. Djakarta, the capital of the Republic, has increased in population by over a million since the end of the war. Areas between Djakarta and Tandjong Priok are below the sea's high-water mark and the frequent inundations leave brackish-water puddles which are breeding places for mosquitoes, a situation which is the source of the capital's malaria epidemics. To deal with it, the authorities have planned to raise low areas of land, and in order to obtain the necessary fill for the project, deep canals will have to be dug. These will connect with the inner harbor of Tandjong Priok by means of lift-locks, thus enabling coasters as well as larger ships to enter them. It is easy to see, therefore, that the Musi, with her sister dredges, will have plenty of work to do.

Indonesia lives on its exports, which include oil, rubber, tin, copra, tea, tobacco, and palm oil. The population of the Republic is over 70,000,000, and its territory includes the large islands of Sumatra, Java, Soembawa, Soemba, Flores, Celebes, and Ceram, as well as many smaller islands.

New Tractor Brake

A new self-energizing disk brake for its industrial wheel tractors has been announced by The Oliver Corp., 19300 Euclid Ave., Cleveland 17, Ohio. The company claims that the brake will safely hold heavy loads on inclines, make short turns and control the tractor more easily, and stop smoothly without grabbing or swerving.

Light pressure on the pedal will hold equally well forward or backward, the company points out, while the disk brakes have long life and ease in adjustment.

Further information may be secured from the company. Or use the Request Card that is bound in at page 18. Circle No. 752.

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Bob Equipment Co., 1601 Chamberlayne Ave., Richmond 10; 405 Center Ave. N.W., Roanoke 7.

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WEST VIRGINIA—Atlas Equipment Corp., Pittsburgh.
Bob Equipment Co., Kanawha Blvd., Charleston 25; East on U.S. 50, Clarksburg; P.O. Box 250, Bluefield.
L. B. Smith, Inc., Philadelphia, Penna.

WISCONSIN—Cunningham-Ortmayer Company, Milwaukee 46, Eau Claire and Green Bay.

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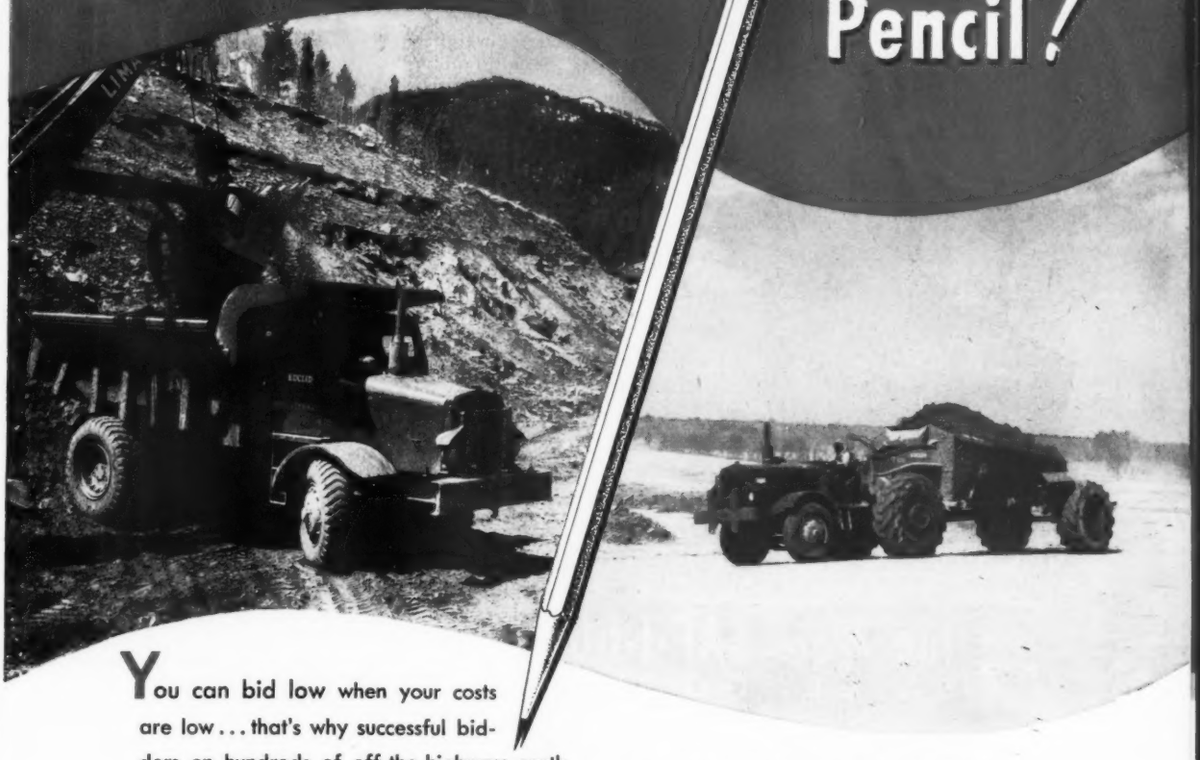

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Bottom-Dump Euclids—13 to 25 cu. yds... 190 to 300 h.p.... top speeds loaded to 34.4 m.p.h.

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The EUCLID ROAD MACHINERY Co., Cleveland 17, Ohio

EUCLIDS

Distributor Doings

I-H Demonstrates Brush Clearing

• MODERN soil-conservation and brush-clearing methods made possible by modern crawler tractors were demonstrated by International Harvester Co. at Carmel, Calif., last July. Sponsored by I-H through its Salinas distributor, the Farmer's Mercantile Co., the demonstration was held on the huge 20,000-acre Rancho San Carlos, in Carmel Valley, about 6 miles east of the seacoast. Some 275 visitors from as far away as Washington, D. C., Massachusetts, Mississippi, and other states came to see the equipment work.

The principal part of the show was a 17-acre clearing job in heavy brush and poison oak. Before the machines moved in, it was an impenetrable tangle. In exactly 3 hours' time, the brush lay neatly piled in gulches around the edge of the site, and the topsoil had been cross-disked for seed planting in such a way that the danger of soil erosion had been eliminated. An International TD-6, TD-9, TD-14A, two TD-18A's, and the powerful TD-24 took part in the work.

As the machines worked singly or abreast of each other, officials of the Soil Conservation Service and International Harvester explained over a loudspeaker system how the operators were going about the job. For example, the necessity for stripping brush clean without gouging the topsoil loose was stressed. Cross-disking, which stops rainfall where it hits and permits the water to soak into the ground, was explained.

Officials told also how large industrial-type tractors have been used successfully on Rancho San Carlos in a modern program of soil conservation. The ranch owns two TD-18A's equipped with Bucyrus-Erie hydraulic dozer blades. About 3,000 acres of brush still remained to be cleared when the ranch was visited—work which takes the summer months from May to September. Cleared land is disked in September, and sowed ahead of fall rains. Several other months are spent building small dams, detention reservoirs, and stock-watering ponds. This pays off both in flood control and increased beef production on the ranch.

Ray Day Photo

At the Rancho San Carlos demonstration in California, an International TD-24 and two TD-18A's all with Bucyrus-Erie dozer blades, team up to shove a heavy windrow of brush to a nearby gulch, where the material will be burned during the winter.

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MORE YARDAGE PER DAY

• Elimination of excess materials and careful weight distribution permit rapid, rhythmic operation of Wellman Dragline Buckets. Operators can cover a wider digging radius with this streamlined bucket.

Built of special alloy steel, using strong welded design, Wellman buckets provide strength and stamina for long-term economy. Perforated designs also available. You'll do better with Wellman.

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SAFETY GOGGLE

With Replaceable Lens

- Velvety Comfort—VINYL frame fits contour of all faces snugly.
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RIDGID

Spiral Reamer

1/8" to 2"
RIDGID SPIRAL REAMER 2-S
RIDGID also makes No. 2 extra-long-taper pipe reamer—reams only burr, won't harm pipe or conduit.

NOW fast easy reaming with the new RIDGID 2-S Spiral

- ★ Reams pipe fast, easily and cleanly.
- ★ Makes quick work of enlarging conduit box outlets—cuts holes in sheet metal, smoothly, no chatter. Reams soil pipe.
- ★ Special design blades feed into metal at lightest pressure, cut it like wax.
- ★ Typical RIDGID tested design, fine craftsmanship and materials—extra long service for your money.
- ★ Buy the new 2-S spiral at your Supply House.

Reamer unit sold separately—fits your RIDGID OOR threader handle

THE RIDGE TOOL COMPANY • ELYRIA, OHIO

RIDGID
Work-Saver Pipe Tools

Visitors were told that the cost of clearing can pay for itself in increased land value alone, to say nothing of hay and pasture crops which can be grown after the brush is removed. The usual scheme at Rancho San Carlos is to sow a hay crop for two years after the brush is cleared, and then to put in the permanent pasture grasses: dry alfalfa, rye, fescue, and Harding grass.

International Harvester officials from all over the nation attended the important demonstration, and included Frank Farley of Chicago, Edward Rexman of International's mobile training unit, and many officials of the Oakland district office, including District Manager H. C. Knudsen, Jack Bess, Lew Weeks, Tom Jackson, Fred Knox, Ervin Stran, and Jack Shields.

Ray Day Photo

International Harvester's Distributor James Orton, Stratford, Calif., (left) discusses a shot with Industrial Power Representative Fred Knox, of the I-H Oakland Office.

A-C Booklet of Demonstration Tips

"Demonstrations Sell", a booklet recently published by Allis-Chalmers Mfg. Co., Milwaukee, Wis., shows the importance of demonstrations to a sales program and how to stage them.

The booklet suggests that in establishing a demonstration program, the dealer should start a year ahead, educate his organization on demonstration techniques, and explore all audience possibilities (the different groups which a demonstration would help convince). It is important for the dealer to know his goal, his personnel, his products, audience, job site, and the value of repeat performances.

Allis-Chalmers believes that such demonstrations pay off in four ways: sales increase as a direct result of the show; a more thorough knowledge of the equipment is gained by the team; new sales outlets are opened to the selling force; and the dealer, through conversation with a cross section of the buying public, becomes familiar with the equipment needs, buying seasons, and habits in his territory.

Two New Distributors for Huber

Two new distributors have been appointed by Huber Mfg. Co., Marion, Ohio, to handle its line of road maintenance equipment. Brinker Supply Co., 135 N. Broadway, Dover, Ohio, will handle the company's complete line in southeastern Ohio. The firm, under Manager E. L. Montgomery, is a branch of the Pittsburgh, Pa., office.

In central and northwestern Illinois, A. E. Hudson Co. will distribute Huber's entire line of tandem and 3-wheel rollers and the Huber Maintainer. The company's main office is on Route 150 in Morton, Ill. Branches are at 719 E. Jefferson, Springfield, and 11th and 51st Ave., Rock Island, Ill. A. E. Hudson is President, and Robert

(Continued on next page)

LENKER

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—FOR—

ENGINEERS, ARCHITECTS & CONTRACTORS

A

DIRECT READING LEVEL ROD

—FOR—

TAKING ELEVATIONS WITHOUT COMPUTATIONS

NO ADDITIONS OR SUBTRACTIONS OF BACK-SIGHTS OR FORE-SIGHTS

EVERY ROD READING AN ELEVATION

ONLY TWO COLUMNS NEEDED IN THE NOTE BOOK—STATION and ELEVATION

ACCURATE
SPEEDY
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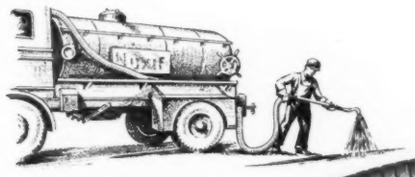
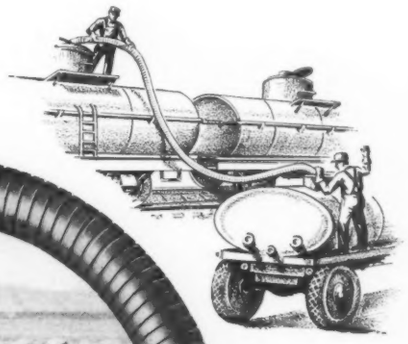
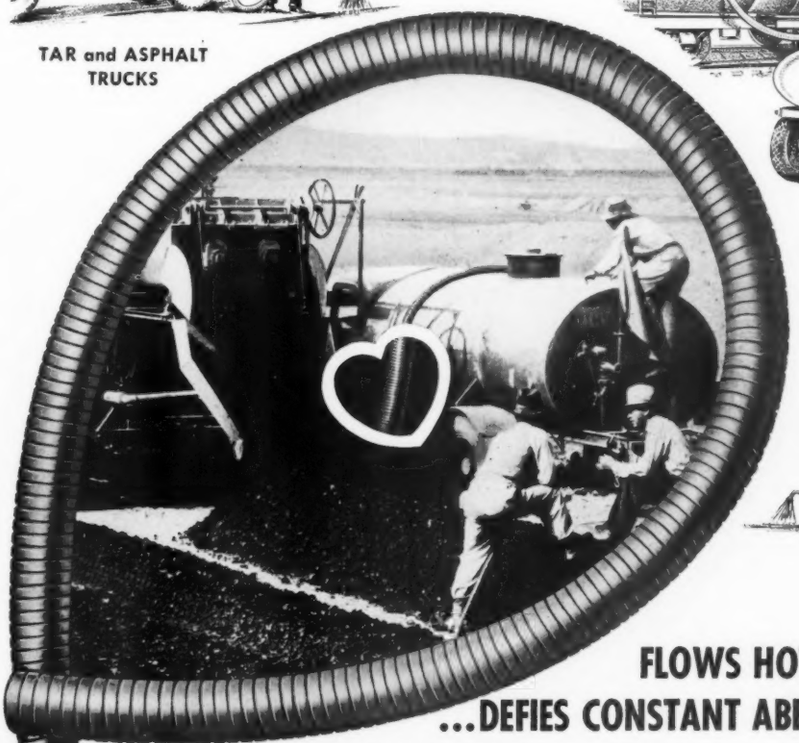
Strike Back!
GIVE
TO CONQUER CANCER

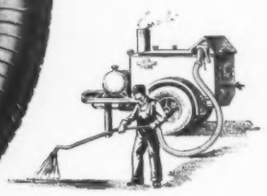


TAR and ASPHALT TRUCKS



TANK CAR UNLOADERS





TAR KETTLES

FLOWS HOT TAR FREELY
...DEFIES CONSTANT ABRASION, HEAT

LEAK-PROOF, HEAT-PROOF, WEAR-PROOF
PENFLEX FLEXIBLE HOSE ASSURES SAFE TROUBLE-FREE TRANSMISSION OF HOT TAR

From coast to coast, leading manufacturers and users of road surfacing equipment rely on tough, flexible PENFLEX interlocked metal hose for safe, free-flowing, trouble-free transmission of hot tar and asphalt. Tight as pipe—but *flexible*—rugged, leak-proof PENFLEX hose defies constant flexing, crushing, kinking, abrasion and heat . . . eliminates danger of fires.

There's a tough PENFLEX hose for every type surfacing equipment. On tar mixers, tar and asphalt trucks, tar kettles, tank car unloaders—used both as flexible metal connections and as insulated hand hose for road spraying and patching units—PENFLEX assures top safety, efficiency, and dependability.

To solve your toughest tubing problems, call on PENFLEX engineering (flexineering) and the complete PENFLEX line of sturdy, hard-wearing flexible metal hose and heat-proof couplings. For full details on application of PENFLEX tubing to all types of tar and asphalt equipment, write today for Bulletin 91.

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HEART OF INDUSTRY'S LIFE LINES

Distributor Doings

(Continued from preceding page)

Douglas and R. D. Abrell are Branch Managers at Rock Island and Springfield, respectively.

Both dealers have complete sales and service facilities.

Straub Appoints Dealer in West

Miller Machinery Co., Missoula, Mont., has been appointed a sales representative for Straub Mfg. Co., Inc., Oakland, Calif., manufacturer of rock crushers. The dealer firm will distribute Kue-Ken crushers exclusively in Montana, west of Livingston, and the following Idaho counties: Lemhi, Custer, Valley, Butte, Blaine, and Clark. Additional nonexclusive territory includes the rest of Montana and the southern part of Idaho.

New District Men for Hough

Two new District Representatives have been appointed by Frank G. Hough Co., Libertyville, Ill. Both men, who recently completed a rigorous sales training program, will work with Hough distributors in the application of Hough Payloader tractor-shovels and tractors. They replace Jim Suter who has become associated with Cornhusker Tractor & Equipment Co., Hough distributor at North Platte, Nebr.

Dan Dailey will cover Sales District 4, comprising North and South Dakota, Minnesota, Iowa, Wisconsin, and upper Michigan. He will have headquarters in Minneapolis, Minn. Dick Lewis, with headquarters at Kansas City, Mo., will cover Sales District 5—western Missouri, Wyoming, Nebraska, Kansas, and Colorado.

St. Louis Dealer Handles Two More

The Missouri-Illinois Tractor & Equipment Co., St. Louis, Mo., has been authorized a distributor in eastern Missouri and southern Illinois for Link-Belt Speeder Corp., Chicago, Ill., and "Quick-Way" Truck Shovel Co., Denver, Colo. The company will handle the complete lines of L-B Speeder shovels and cranes, and "Quick-Way" shovels, trench hoes, scoops, cranes, draglines, clamshells, pile drivers, and backfillers. It will maintain sales, service, and repair facilities in St. Louis, Quincy, Ill., and Charleston, Mo.

Missouri-Illinois also serves as authorized dealer for Adams, CMC, Hough, Ingersoll-Rand, and International Harvester.

New Orleans Firm for Nelson Stud

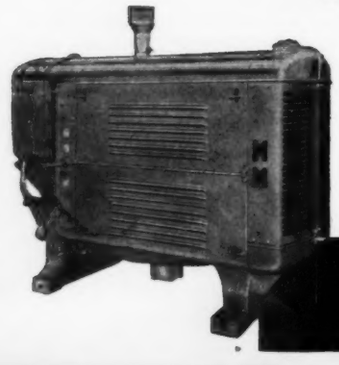
Reilly-Benton Co., Inc., New Orleans, has been appointed a dealer for the Nelson Stud Welding Division of Gregory Industries, Inc., Lorain, Ohio. It will distribute in southeastern Louisiana, southern Alabama, and Mississippi. The company will offer a complete sales, rental, and repair service and carry a stock of all types of Nelson roofing and siding fasteners and insulation studs.

Al Lusch is General Manager of the firm, located at 2502 Poydras St.

"Cat" Preventive-Maintenance Film

"Keep It Earning", a 16-mm sound-color film demonstrating the importance of preventive maintenance for Caterpillar motor graders, is available through the dealer organization of Caterpillar Tractor Co. The 25-minute moving picture is supplemented by a 24-page cartoon-style booklet, "Main-

LOADS OF OVER 25 TONS LIFTED HIGH AND DRY



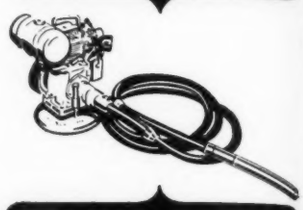
Ol' Man River's Punch was met with preparedness when flood threatened devastation to Omaha's industrial area. The city's disaster committee made arrangements for moving of equipment to minimize loss. MM powered American Cranes were called into service and "not a single American Crane, working around the clock, had to stop or slow down for any reason."

Manufacturers of heavy equipment know that the success of their unit often depends on the power unit. That's why more and more of them select MM economical, low-speed, high-torque power units of proved dependability. Can you afford to settle for less?

See Your MM Dealer Distributor or Write

MINNEAPOLIS-MOLINE
MINNEAPOLIS 1, MINNESOTA

YOU GET
VIBRATION-PLUS



WITH VIBRO-PLUS
INTERNAL VIBRATORS

. . . even "no slump" concrete flows easily!

Users call Vibro-Plus the most efficient of all internal vibrators. That's because its patented ROLLGEAR* Vibrating head steps up the 3600 RPM shaft speed to 11,000 to 15,000 VPM—does a more effective job of consolidation—with these *plus-values*...

—Astonishingly long service from shafts

—Easier lubrication (grease the shaft in 15 seconds, even while running — the head needs no lubrication ever)

—Lowest maintenance cost

—Handles the stiffest mix with ease

—6 months guarantee

Write for complete facts and name of nearest distributor.

*Reg. U. S. Pat. Off.

TYPE MRSB—Gasoline driven. *Furnished with 2½ or 4½ HP Wisconsin or Brigg & Stratton air-cooled engine on 360° swivel base, with foolproof snap coupling for 20 or 30 ft. flexible shaft. No V-belt, no clutch, no gears. Rollgear vibrator head and shaft interchangeable for electric or pneumatic power if desired. Available with 1¾", 2 3/16", 2¾" and 4" diameter heads. Grinding attachments available.*

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54-11 QUEENS BOULEVARD
WOODSIDE, L. I., NEW YORK

Now!

BUY used equipment
SELL used equipment
ACQUIRE competent personnel

through

The Trading Post Section of
CONTRACTORS & ENGINEERS MONTHLY

See page 119

tenance Guide", previously issued by the company for operators and servicemen.

Dealers receiving the film get copies of the "Maintenance Guide", a meeting-plan outline, display cards, full-flow filter bulletins, registration cards, cards for display outlining "Cat Care" procedures, etc.—everything necessary for a preventive-maintenance meeting.

Patent Scaffolding in Connecticut

The Patent Scaffolding Co., Inc., Long Island City, N. Y., has appointed Arnold Co., 3255 Fairfield Ave., Bridgeport, Conn., a representative for the rental and sale of Trouble Saver sectional steel scaffolding and Gold Medal Junior Swinging scaffolds. The firm will also sell Patent's aluminum scaffolds.

Joseph P. Arnold organized the company in 1945 to sell and service contractors' equipment in Connecticut.

Cummins Mid-West Co. Formed

The Omaha, Nebr., facilities of Cummins Diesel Sales Corp. have become an independently owned Cummins dealership with the new name, Cummins Mid-West Co. Headquarters will remain at 5515 Center St., and branches will continue to operate in Des Moines, Iowa, and Hastings, Nebr. The company's territory includes Iowa, except for Scott County; Nebraska, except for the 11 extreme western counties; and 44 counties in central and south-eastern South Dakota.

J. E. Everroad, former President of the Fort Worth dealership, heads the new firm. He has been with Cummins Engine Co., Columbus, Ind., since 1932.

Service Manager for Duval Engine

Raymond Burton has joined Duval Engine & Equipment Co., Cleveland, Ohio, distributor of diesel gas-power units and generating sets, as Service Manager. In this position, he will supervise all engine repair and rebuilding, as well as repair work in the field. Mr. Burton has had 19 years of internal-combustion-engine experience.

Kansas Distributor for Nordberg

Mead Engine and Welding Works, Sterling, Kans., has been appointed an industrial distributor for Nordberg Mfg. Co., Milwaukee, Wis. The firm will handle Nordberg 4FS diesel engines throughout Kansas except in the northeast section.

Mead, established in 1926, is planning a new office building with sales and parts room for the engines. Harry J. Mead, head of the company, owns and operates an airplane, permitting him to contact customers and prospects throughout the state.

New Dealer for Warco Graders

The Municipal Machinery Co., Coram, N. Y., has been named a sales and service agency for W. A. Riddell Corp., Bucyrus, Ohio. The equipment and supply firm, established in 1939, will sell and service Warco 4D-85 and 4D-100 motor graders in the Long Island, N. Y., area.

Kenneth Rhodes is General Manager, and Joseph Johnson is Parts and Service Manager.

"Please don't feel it's necessary to make conversation—"

A-C Distribution in New York

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has named Ben Beverly Equipment Co., Inc., 38-02 28th St., Long Island City, N. Y., a distributor of A-C pumps. The dealer will cover 12 south-eastern counties in New York and 12 north and central counties in New Jersey.

Ben Beverly is President of the five-year-old firm.

For A. O. Smith Corp. in Indiana

Donie Engineering Sales, Inc., Indianapolis, Ind., has been appointed manufacturer's agent for A. O. Smith Corp., Milwaukee, Wis. The company will distribute Smith safety grating in Indiana.

Two New Distributors for Cleco

The Cleco Division of Reed Roller Bit Co., Houston, Texas, has appointed two new distributors for its Cleco and Dallett lines of air tools and accessories. Harry P. Leu, Inc., Orlando, Fla., and Ace Equipment & Supply Co., Inc., Hillside, Ill., will handle Cleco products in their areas.

New Magnesium Level

A new die-cast magnesium carpenter's level is produced by Mayes Bros. Tool Mfg. Co., Port Austin, Mich. The 24-inch level features permanently set vials which are moisture, dust, and dirt-free. It has a new vial fluid which is said to withstand great extremes of temperature.

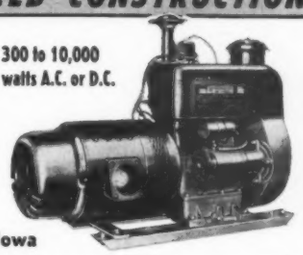
The level is finished in gold bronze, with royal-blue putty sealing the permanently set vials.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 734.

POWER PLANTS SPEED CONSTRUCTION

Use Power Tools—Flood Lights

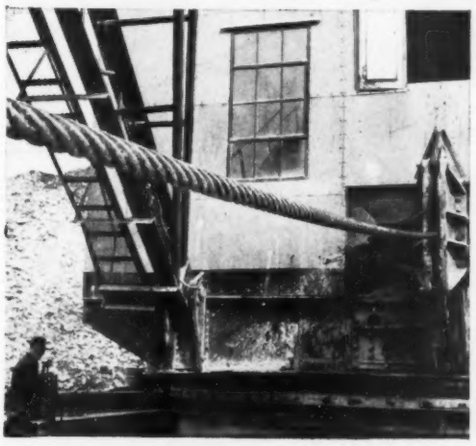
Winpower Portable Electric Plants provide a dependable, low cost power source . . . speed up work performance by operating time and labor saving power tools. Winpower Nite-Hawk units give power plus built-in floodlights. Every contractor should use these high efficiency, quality built plants.



WRITE FOR LITERATURE AND PRICES

WINPOWER MFG. CO., Newton, Iowa

The Proper Rope *plus* Proper Maintenance



This new Tiger Brand Drag Line Rope was designed especially to resist the extremely severe operating conditions encountered in this class of service. On one job where ropes lasted an average of 600 hours, this Tiger Brand Drag Line Rope was still going strong after 1100 hours—believe it or not!

Equals **Longer Rope Life Lower Rope Costs**

● Many prominent users of wire rope have found they can reduce wire rope costs as much as 50% by using a wire rope designed for the job. They get better rope service at lower rope cost by following this simple, job-tested system, with the help of the Tiger Brand Wire Rope Specialist.

Let this qualified expert make *sure* that you select, for each job, a wire rope that is strong enough to carry the load with an ample margin of safety . . . able to stand incessant flexing and sharp bending without failure of wires due to fatigue . . . built to take the most severe abrasion and crushing. Then make sure that every foot of wire rope you own is inspected, cleaned and lubricated *regularly*.

Engineers and contractors who follow this procedure tell us that they are getting twice — sometimes three times—the life they expected from Tiger Brand Wire Rope, plus greater safety for crews and equipment and freedom from rope-caused work stoppages, all of which means important money savings.

When you are in the market for wire rope, make full use of the engineering knowledge of an expert who has made a life-work of analyzing and solving wire rope problems. Just drop us a line and your Tiger Brand Wire Rope Specialist will be glad to consult with you. Meanwhile, why not send in the convenient coupon for a copy of our latest book?

More than a million tons of oyster shells have been converted into chemicals at this plant. The owners have found that Tiger Brand Wire Rope stands up best under these severe abrasive conditions, cutting rope costs, reducing down time and keeping equipment at top capacity.

SEND FOR THIS NEW BOOK. It contains specification data that will help you select the right rope for each application. In descriptive text, illustrations, diagrams and tables, it gives you complete information on types of rope, diameters, working loads and safety factors for all sorts of rope service.

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Cleveland 13, Ohio

Please send me your new book, "Specification Data, Tiger Brand Wire Rope."

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UNITED STATES STEEL EXPORT COMPANY, NEW YORK

U·S·S AMERICAN TIGER BRAND WIRE ROPE

Excellay Preformed

UNITED STATES STEEL

Porcelain Enamel For Tunnel Ceiling

The first tunnel ceiling ever constructed of architectural porcelain enamel has been completed in the Elizabeth River Tunnel between Berkley and Portsmouth, Va. The ceiling is composed of porcelain-enameled 14-gage steel pans, measuring approximately 7½ x 2½ feet and with a thickness of 3 inches. They are filled with concrete for weight and rigidity and mechanically fastened to the tunnel lining. The ceiling was manufactured and installed by Seaporcel Metals, Inc., of Long Island City, N. Y.

The pans are installed with the 7½-foot dimension transverse to the direction of traffic, supported on four rows of continuous stringers, which in turn are hung from the concrete tunnel lining by means of rods hooked into anchors previously embedded in the lining. The joints between pans and along the edges are sealed with a plastic filler strip and caulking compound in order to insure a tight ceiling.

In addition to other advantages, a porcelain-enamel ceiling for tunnels breaks the small-pattern monotony of tile construction. The Elizabeth River Tunnel shown is the first tunnel to use this type of ceiling. Seaporcel Metals, Inc., Long Island City, N. Y., manufactured and installed it.

The company points out the following advantages of porcelain ceiling over the more conventional hung reinforced-concrete-slab and tile-unit construction.

1. Since the total thickness is only 3 inches (compared to approximately 9 inches for concrete and tile), this offers the opportunity to gain about 6 inches in vertical clearance or in additional cross-section area of the tunnel's upper ventilation air duct. For example, the Elizabeth River Tunnel has a posted clearance of 13 feet 6 inches, as compared to the New York tunnels, which range from 12 feet 9 inches to 13 feet.

2. The comparatively large size of the porcelain units, together with the feature of mechanical fastening to the supporting stringers, reduces the field labor of installation to a minimum and offers a simple and quick method of replacement if necessary.

3. Experience in recent tunnel fires in the New York area has shown that the concrete lining apparently expands with excessive heat, detaching the small tile units and projecting them into the traffic area at dangerous velocities. The mechanically supported porcelain panels eliminate this hazard entirely and the special porcelain coating is highly resistant to rapid changes in temperature, remaining unharmed even when subjected to 1,600 degrees F.

4. It is anticipated that this ceiling will be considerably easier to wash and clean due to the extremely hard and smooth surface and the great reduction in the area of joints as compared to the small-sized tile construction.

5. Many observers have remarked that this ceiling, with only two parallel joints along the roadway, presents a much more pleasing appearance than the small-sized pattern of tiles.

6. Final adjustment of ceiling height can easily be accomplished after installation by means of the U-bolts which support the stringers.

The development of this type of tunnel-ceiling construction is the result of the combined effort of Seaporcel Metals, Inc., and Parsons, Brinckerhoff, Hall and Macdonald, Consulting engineers. Merritt-Chapman & Scott Corp. is the general contractor for the tunnel.

In all, a total of approximately 4,000 individual panels, 531 cubic feet of concrete, 180 tons of enameling iron, and 116 tons of structural steel were used in the new ceiling. All hangers and hardware are of stainless steel.

LITTLEFORD "SPRAY MASTER" BITUMINOUS DISTRIBUTOR

Gives you low cost
• mix in place
• seal coat jobs

Spraying of asphalt tar, emulsion, road oil and cut-back can now be done with 100% efficiency by using a "Spray Master" Distributor. This modern unit gives accurate application under all conditions. "Spray Master" has fewer controls, no gadgets to operate, eliminates excessive labor. Equipped with a Vacuum Flow Full Circulating Spray Bar up to 24' makes the "Spray Master" the master of all black-top construction and maintenance jobs. Made in sizes from 800 to 4000 gallons. Make your spraying jobs low cost by using the unit designed to save time and money. Ask for Bulletin 14.

LB LITTLEFORD
BLACK TOP ROAD MAINTENANCE EQUIPMENT SINCE 1900
LITTLEFORD BROS., INC.
485 E. Pearl St., Cincinnati 2, Ohio

STERLING SRD* PUMPS NEVER LET YOU DOWN!

From 1½" to 10"
4000 GPH to 200,000 GPH

You can always depend on Sterling SRD* Self Priming Centrifugals. These rugged, heavy duty pumps are specially designed for dewatering on construction job — they NEVER CLOG, NEVER STOP as long as they have fuel! They pump continuously without attention all day, all night!

Sterling trash handling impeller is automatically self cleaning...recirculating priming action is automatic, never fails...suction check valve positively seals repriming water in pump-body...plus many more advantages that make these the MOST DEPENDABLE PUMPS MONEY CAN BUY!

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See your Sterling Dealer or write for catalog

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Everybody Says OK
PERMITE CONCRETE CURING COMPOUNDS

All three types of Permite Concrete Curing Compound meet or exceed the specifications of most cities, counties and states, all the Federal Agencies, the Corps of Engineers, U. S. Army, and the Department of the Navy.

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● DISTRIBUTORS IN MAJOR CITIES FOR QUICK SERVICE.

Three Permite Curing Compounds

PERMITE CONCRETE CURING COMPOUND

PERMITE W-95
Concrete Curing Compound — for curing of horizontal surfaces.

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A Resin Base Concrete Curing Compound for horizontal surfaces.

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A Resin Base Concrete Curing Compound for architectural or vertical concrete surfaces where non-discoloration is important.

ALUMINUM INDUSTRIES, Inc.
Cincinnati 25, Ohio

Write for Catalog data and Distributor's name.

A Few Good Distributor Territories Open!

Sewage Contractor Tries New Job Kink

One-Pass Dirt Backfill Made by Special Trench Digger Is Interesting Feature of Sewage-Treatment Project

By RAY DAY

• A TRENCH digger that moves along under its own power, holding excavated dirt long enough to let pipe crews install a cement-asbestos pipeline, and then dumping it back in the trench without spilling a shovelful, is one of the interesting kinks recently developed on a job at Lake City, Wash. The job is a major enlargement of the sewage-treatment facilities for a rapidly growing suburb of Seattle, and the contractor who has been using the novel idea is Hoagland & Findlay Engineering Co. of Seattle and Long Beach, Calif. Lake City Sewer District, a community corporation, is the contracting agency.

Lake City, north and east of Seattle's city center, is conducting a major expansion of its sewage-treatment facilities to meet a mushrooming population and building boom. Included in the present schedule is a 2½-mgd sewage-treatment plant, two major sewage trunk lines, a 6-foot effluent line, and a 7-foot horseshoe discharge tunnel. Chlorinated purified effluent from the plant will pass through the tunnel and out to its discharge point 65 feet below the surface of Lake Washington. A rather unusual design feature is a series of pumping stations along the Lake Washington shore to pick up shoreline sewage from homes in that area, and a 14-inch pipeline hung from the tunnel ceiling and leading back to the treatment plant.

A Necessary Invention

The field adaptation of a stock-model trench digger and other equipment to make a self-contained excavation unit was one of those cases which, long ago, gave rise to the saying "Necessity is the mother of invention". Hoagland & Findlay Engineering Co. not only landed the $750,000 sewage-treatment plant contract, but was also low bidder on about 14,000 linear feet of 8-to-14-inch cement-asbestos sewer-collection pipeline around the lake shore.

The design of this line was a headache. Over the years, the shore of beautiful Lake Washington has been settled by wealthy people who have built magnificent homes. The only method of sewage collection thus far has been a series of cesspools and leach lines, many of which now fail to have much bacterial action because of the smothered saturated condition of the soil. During the past several years alarming indications of general pollution have developed, and have been verified by samples and analyses made by the Washington Department of Health.

To run a sewage-collection line properly through such an area, it was necessary to route it through narrow streets and alleys, and one long section had to be run squarely down the front lawns of the best homes on the lake front. There was no room to use a backdigger or other conventional dragshovel equipment, and there was no room to stockpile excavated trench material because of thousands of dollars' worth of expensive landscaping.

Nevertheless, lake-front residents were so desperate to have the line installed that they promised full cooperation to contractors and engineers engaged in the work. When the job was visited, one man said, "We've been working on this idea and planning for over 2 years. Today the outfit is crossing my front lawn. It happens to be the same day my wife is entertaining 35 guests from the Women's Club at a lawn party. But believe me, I'm not at all angry about the inconvenience."

With such an agreeable community to work with, and such adverse space conditions to work against, officials of Hoagland & Findlay finally came up with an outfit they modestly say "looks like something by Rube Goldberg out

(Continued on next page)

Working almost at the toe of Lake Washington, this unusual innovation in ditch digging scooted through lawns without hurting a thing. Reason: it did its job in one pass, using its own dirt for trench backfill.

ESTABLISHED GALION 1907
VOTE THE GALION TICKET FOR BETTER ROADS (AT LEAST COST)
Model 118 – 100 h.p. Extra Heavy-Duty
Model 104 – 76 h.p. Heavy-Duty
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Rollers
Tandem
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THE GALION PLATFORM
"THE BEST VALUE FOR YOUR MONEY"
A few of the Motor Grader features that assure this are –
• Most in standard equipment – such as hydraulic booster on manual steering, large-size front tires.
• Constant-mesh transmission.
• All-gear four-wheel drive.
A few of the Tandem Roller features that assure best value are –
• Spur gear, straight-line, final drive.
• Dual operating controls.
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ESTABLISHED GALION 1907
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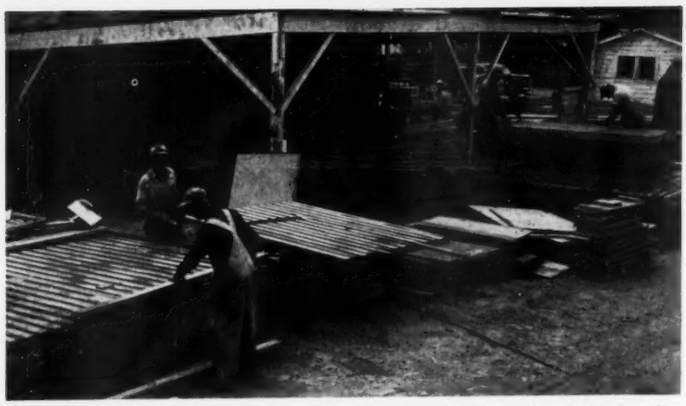

Carpenters build forms for the Lake City sewage plant. The roofed shed makes it possible for the men to work during inclement weather.

Sewage Contractor Tries New Job Kink

(*Continued from preceding page*)

of Joe McGee". The machine consists of a stock-model Buckeye 410 trench-digging machine, a wheel-mounted 50-foot Conveyco 18-inch conveyor which takes the excavated dirt back to the backfill point, a Marlow 2-inch Mud-Hog pump for removing pockets of material too soupy to dig with the machine, and a light plant. The conveyor is driven by a Wisconsin gas engine mounted on the conveyor frame.

The wheel mounting for the conveyor assembly consists of a 9-foot steel axle and frame, with rubber-tired wheels close to the center point. Smaller dollies carry the weight near the front. The conveyor assembly is pulled along by means of a cable bridle attached to the Buckeye machine. There are two ways to keep the conveyor leveled: it is leveled roughly by planking the ground along the trench; and finer adjustments can be made by two screw jacks mounted on the conveyor frame.

By maintaining good timing and close liaison between the various parts of the crew and pipe-hauling gang, this little machine was kept moving along through incredibly difficult terrain at a rate averaging about 115 feet per 8-hour shift. Every foot of lawn was protected by panels of plywood, and 2 x 8 timbers were used for the Buckeye and other equipment to move along. Trench depths varied from 3½ to 7 feet, and the width was 24 inches. In some places the ground was so saturated by previous cesspool operation that trench jacks and shoring were used.

The operation was well timed. Workmen first came through on the trench location and carefully picked up the sod in small 15-inch squares, or thereabouts. This sod was stored nearby, so it could be replaced as quickly as possible. Another preliminary gang then installed the plywood panels and planking. The Buckeye digger operator worked within sight of the pipe-laying gang, and was of course often held up by logs, rock, debris, and the natural difficulty of installing the pipe in the trench. Excavated material for the first 50 feet was disposed of in a vacant lot which happened to be nearby. Over the remainder of the job the excavated material was carried off the ditcher delivery conveyor to the Conveyco 18-inch line, which discharged down a short chute and placed the material back over the newly laid pipeline. Thanks to a thorough jetting job with a 2-in pump, the material was all placed back along the line with little or no room for future settlement.

When the larger-diameter lines were laid down certain narrow streets, it was of course not necessary to plank the way so carefully, and better headway was made. But the little machine had solved a problem in dirt handling and public relations as well, because in many cases—almost all, in fact—the sod was replaced and the lawn was normal within about 48 hours after workmen first opened it up.

Sizable Sewage Plant

The sewage plant is a sizable structure with modern design features, and Hoagland & Findlay are moving ahead rapidly with its construction. Officials estimate October 15 as the date for its completion, less than 8 months after its February starting date.

The new treatment plant will serve a 12-square-mile area covered by Lake City Sewer District. It is being financed by bonds issued against its cost, and will bring about a radical improvement in the previous treatment method, which consisted primarily of taking the solids out and dumping the effluent, chlorinated, back into Lake Washington. The new plant will remove

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the organic substances from the incoming sewage, and discharge clean water into the lake. It will not be capable of contaminating anything.

The plant was designed by Carey & Kramer, Seattle consulting firm, assisted by Consultant Richard G. Tyler. Parker, Hill & Ingman are general project engineers.

From the outside, the plant will appear to be a beautiful industrial building, with glass-paneled exterior and a roof composed of concrete and cement-asbestos sections. Dimensions of the building will be 165 x 134 feet. The plant components include the influent sewer and concrete-delivery channels, grit chamber, primary clarifier tanks, aeration tanks, final clarifier tanks, a Parshall flume, primary and secondary digesters, and a 72-inch outfall line. The plant, which has an extensive ventilating system to aid aeration, also will have an office, laboratory, and chlorine rooms.

With the exception of such special building materials as the glass panels and cement-asbestos roof sections, the main body of the plant is being constructed of reinforced concrete. In general, the plant components are covered with concrete roofs or steel grating, the latter material being used in the concrete-delivery channels.

Ground-Water Problem

Although the plant site is in a low point where over 95 per cent of the district drains by gravity, preliminary indications were that little ground water would be encountered. When the first crews and equipment moved in, they dug two test holes in the northwest corner of the property, and the worst fears of everybody were confirmed, in spite of the favorable preliminary outlook. There was ground water and lots of it. There was also a peat bog through much of the area.

The ground water lay at a level about 4 feet below ground surface, and the bottom of the lowest footings extended 26 feet below ground surface. This condition was general over the whole area, so plans to unwater with 2-inch pumps and a few sumps had to be abandoned.

The area was encircled by rows of Stang and Stang-type wellpoints 21 feet long, jetted down about 3 feet to reach close to the footings. The points were installed on 4-foot centers, hooked to a common header, and two Stang vacuum pumps began to work. The water table began to go down.

It did not go down so rapidly, however, that excavation was easy. Three Caterpillar D8's with 12-yard LeTourneau Carryalls moved in to muck the excavation out and store it off to one side. Topsoil was carefully stripped to help out when the buildings are finished, the backfill is in, and landscaping is started. The "Cats" and scrapers were hardly more than halfway down to grade before they ran into serious trouble. The peat bog sometimes mired a scraper to its tailgate sheaves, so that it had to be pulled out by brute force by one of several D8's and a TD-14 which were also assigned.

When grade was finally reached, the bottom firmed up in fair shape and gave a minimum of trouble when the footings were placed.

Three Northwest 25 cranes take part in the Lake City sewage-plant job. The one in the foreground is handling a piece of concrete pipe.

Formwork and Concrete

Formwork for the concrete structures was handled by methods which have proved economical in many years of sewage-treatment-plant construction by this company. The Lake City plant, incidentally, is No. 17 which Superintendent N. H. Daniels has built for Hoagland & Findlay.

No forms were ever fabricated in place. Carpenters who built these forms worked at a central spot in the yard, where there was ample space, and a supply of power equipment to cut the lumber to proper dimensions. The carpenter shop was under a roof for the protection of equipment. This also helped out in rainy weather when carpenters were busy, because it let them continue working in the shed in spite of the rain.

Two Comet cutoff saws, a Wallace bandsaw, Walker-Turner saws and a planer, and several Speedmatic 10

(*Concluded on next page*)

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Sewage Contractor Tries New Job Kink

(*Continued from preceding page*)

portable saws did most of the cutting. The panels were usually nailed together outside the shop, using a general scheme of 2 x 4 studs with plywood facing wherever the finished concrete was to be exposed. Concrete below the ground was placed against shiplap facing. The form panels were set in place by one of three Northwest 25 cranes assigned to the project. The forms were checked, plumbed, braced in some cases, and held together by Burke patented ties.

Extensive shoring under some of the concrete roofing has been eliminated by placing 8 x 16 fir timbers crosswise across the structures at the top of the walls, and forming the roof on short joists. The falsework could be easily stripped.

All concrete to the project was furnished in truck mixers from the commercial concrete plant operated by Pioneer Sand & Gravel Co. Only a very small portion of the plant was inaccessible to a Northwest crane and a Gar-Bro transfer bucket. The material for this had to be buggied, but in most cases the crane and bucket did the concrete handling. No parts of the plant are so thin or tall that special concrete-handling methods have had to be used.

Specifications called for the wooden forms to remain in place for a minimum of four days. The wet forms gave the green concrete its first curing protection. A water cure was used for another week after forms were stripped. Some of the floor slabs and roof tops were cured with Hunt Process membrane.

Work on the sewage-treatment plant is so important to the Lake City people that Hoagland & Findlay are hurrying to get it finished before winter. Later, as Lake City grows further, there are provisions for adding two other units like this one, with other contracts.

Personnel

When the job was visited the contractor's management was being represented by W. W. Hoagland, Sr. W. W. Hoagland, Jr., is the Manager of the Seattle office of the company, and James Hoagland is supervising the pipeline job where the unusual trench digger was developed.

On the treatment plant, N. H. Daniels is General Superintendent, K. A. Salskov is his Assistant, and Art Dixon is Project Engineer. Chester Daniels is General Foreman, Frank Clark is Labor Foreman, and Charles King is Plant Pipe Foreman.

Good Roads Chairman

L. Judson Morhouse, Executive Director of the New York Good Roads Association, has been named Chairman of the National Good Roads Association, a newly formed organization of state-wide associations representing public interest in good roads. Under his direction, the New York Association has been instrumental in bringing about this year the largest highway program in the history of the state. The group also backed the establishment of the Temporary Highway Finance Planning Commission and aided in the passage of Amendment 4 which gave the state the power to issue bonds for the financing of the New York State Thruway.

The new national association has been established to provide a bridge between state and national efforts to solve highway problems. The temporary headquarters of the association are at 116 Washington Ave., Albany, N. Y.

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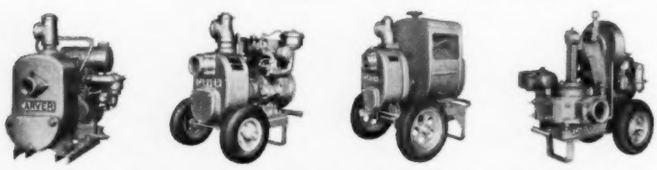

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Under-River Tunnel Is Ahead of Schedule

Steel-Sheet Piling Accelerates Work: Leakproof Membranes Are a Help to Contractors on Cuba Job

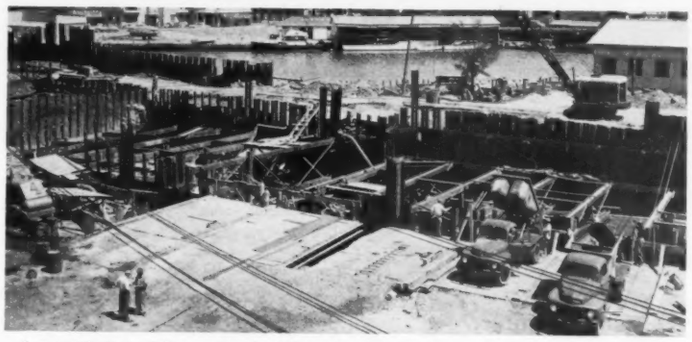
• THE tremendously congested traffic between Havana, Cuba, and the residential city of Miramar has been growing increasingly worse each year. With a view to relieving it, the Cuban Comision de Fomento Nacional (Commission for National Development) has authorized the construction of a new four-lane reinforced-concrete vehicular tunnel under the Almendares River. The tunnel will join existing streets on the east and west banks of the river, formerly joined by a swing bridge, which has now been cut down from its center pier, moved upstream, and re-erected. The contract for the tunnel construction went to Raymond Concrete Pile Co. of South America, an affiliate of Raymond Concrete Pile Co., New York, N. Y., and Constructora Morr, S. A., Raymond's Cuban associate, in September, 1951, and the work was scheduled for completion in February, 1953. It now looks, however, as if the tunnel will be holed through this month and opened to traffic in December.

The tunnel, constructed by open-cut methods, will have a total length of 1,714 feet, including approaches. The actual underground section will consist of a 709-foot-long 72-foot-wide reinforced-concrete box, with a 15-foot free height; the approaches will be 90 feet wide. While the walls and roof of the box section will be 6 feet thick, the bottom slab of the approach sections will be 11 feet thick at the portals to counteract the effect of buoyancy on the structure.

Steel-Sheet-Piling Membrane

After the existing swing bridge was dismantled and moved to its new location and the site cleared, work started on the west, or Miramar, approach and on the west section of the tunnel. The approach area was isolated from the tunnel area by means of a lateral wall or "membrane" of steel-sheet piling driven 20 feet into the ground, about 70 feet east of the tunnel-portal location. This permitted excavation of the approach, while at the same time the cofferdam for the west section of tunnel box was being pumped down.

The cofferdam is rectangular in shape, approximately 290 feet long and 75 feet wide, with piles driven in depths varying from 20 to 45 feet, the latter figure being the depth at the lowest point of the tunnel slope.



A general view of the west end of the cofferdam for the west section of Almendares River. The lateral wall, or membrane (left), isolates the approach section (foreground) from the tunnel section. At right, the floor slab for the approach section near the tunnel portal is being poured.

Removal of Center Pier

A problem arose in the removal of the center pier of the swing bridge that remained after the superstructure was moved. Since the new vehicular tunnel followed the same route as the bridge, the pier was directly in the path of the cofferdam. This is what the contractors did.

Approximately 20 feet west of the pier the same type of membrane as used at the tunnel portal was installed. The cofferdam was then extended approximately 20 feet east of the pier and a second membrane installed. In this manner, the pier cofferdam was isolated from the tunnel cofferdam, and excavation and construction was started for the major part of the tunnel box, while the pier cofferdam was being pumped down and the pier demolished and removed. When the latter work was completed, the membrane west of the pier site was pulled and the construction work for the tunnel box was extended up to the membrane east of the pier site.

Auxiliary Walls Aid Construction

During the planning, the question arose as to the method to be used in excavating and constructing the tunnel box. It would have been possible to do this work from floats, but it was decided that the project could be

(Concluded on next page)

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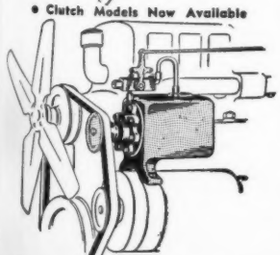

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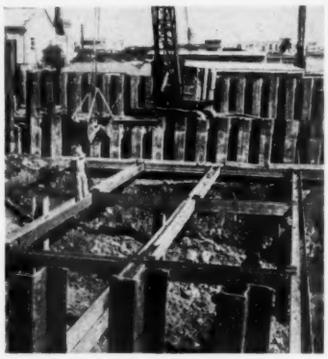
Under-River Tunnel Is Ahead of Schedule

(Continued from preceding page)

handled more efficiently if the excavating and concrete pouring could be done from dry land.

For this purpose, auxiliary steel-sheet-pile walls were driven approximately 30 feet upstream and downstream from the main walls, and extending outward from the shore for a distance of about 160 feet. The space between the main and auxiliary walls was packed with a dense earth fill to a height just above water level. The main purpose of the fill was to provide a platform for the men and equipment such as trucks, power shovels, excavators, and so forth. It also served a secondary purpose in that it supplied sealing for the main walls.

Approximately the same procedure has been used for the excavation and construction on the east, or Vedado, approach and the east section of the tunnel. However, because the riverbed is much shallower at the east bank than it is near the west bank, it has not been necessary to drive a membrane near the site of the east portal. Instead, the approach areas and the tunnel area are being excavated as a unit.



This closeup of the cofferdam for the tunnel's west section shows the lateral cross-bracing. A clamshell-bucket tractor-crane is working between the main wall and the auxiliary wall.

Support for all cofferdam walls against lateral pressures has been given by welding cross-bracing members in place. It has been found that a minimum of maintenance was required on the piling and there has been little or no leakage once it was installed and braced.

Supplies and Personnel

Steel-sheet piling in 40 to 50-foot lengths was supplied by L. B. Foster Co., Pittsburgh, Pa. Arthur Fertell is New York Office Project Manager; and Daniel J. Wilson is General Superintendent for the Raymond Concrete Pile Co. of South America. Amandeo Lopez Castro is President of the Comision de Fomento Nacional; Jose Menendez, a member of the Comision, conceived and designed the tunnel. The Resident Engineer for the Comision is Manuel Ray.

Ceco Expansion Program

An 18-acre tract in Broadview, Ill., has been purchased by Ceco Steel Products Corp., Chicago, Ill., manufacturer of metal building products, as a site for a new 50,000-square-foot plant. This plant ties in with the firm's nationwide expansion program begun after World War II. Other current expansion includes: a warehouse in Dallas, Texas; new fabricating plants in Omaha, Nebr., and Kansas City, Mo.; a warehouse in Atlanta, Ga.; a third addition to the Ceco plant in San Francisco, Calif.; a new plant and warehouse in Pittsburgh, Pa.; and additions to the company's office and warehouse in Minneapolis, Minn.

Ceco has already erected new buildings in nine cities, and on completion of the present building program the company will have a total of 22 plants and warehouses and 34 sales offices throughout the nation.

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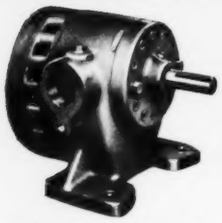

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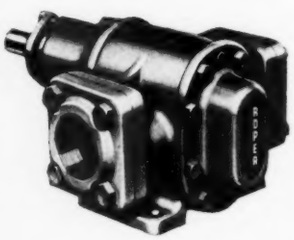

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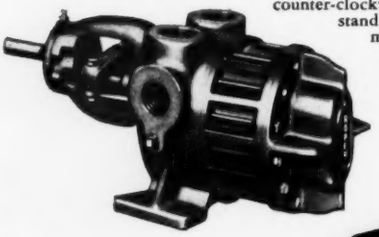

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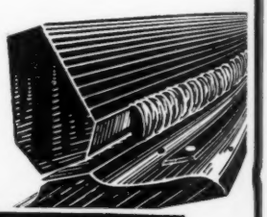

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Concrete Pavement Widened, Resurfaced

Improvement on U. S. 54 Includes Widening Sides With a 12-Inch AC Base, Covering Top With AC Surfacing

• A MAJOR part of the Missouri State Highway Department program for 1952 was the improvement of many miles of well-traveled—but outmoded—highways. The modernization of a 10-mile section of U. S. 54 near Fulton, Mo., was typical of the work done.

The 18-foot-wide portland-cement concrete pavement in this area was in fair shape structurally, but it was definitely too narrow for the volume of traffic carried. The Department decided to widen it 3.9 feet on each side with four 3-inch courses of an asphaltic-concrete base mix and to cover it with two AC courses, a base and a surface course, to a width of 24 feet.

Trinidad Asphalt Mfg. Co., St. Louis, took the contract on a $420,375 low bid. Work started May 1 and moved along rapidly until May 12, when the job was shut down by a labor strike that plagued the entire state. Work was resumed May 18 and the job completed July 12.

Widening

Trinidad crews worked one side of the road at a time (to permit traffic access on the other lane at all times), and in small sections, so that rain wouldn't wet down too much of an open cut. A Caterpillar No. 12 grader first scarified the dirt shoulder and then cut in close to the edge of the pavement to throw up a slight riding ridge for the "trencher" which followed. This was a Traxcavator, mounted on a D4, with a specially formed lip on the bucket. With the ridge thrown up about 5 feet from the pavement edge, the D4 could ride level with one crawler tread on the pavement and the other on the dirt.

The widening trench had to be exactly 3 feet 9 inches wide and 12 inches deep—so that no forms would be needed for the four 3-inch layers of asphaltic concrete. Trinidad took out a section of the bottom of the Traxcavator bucket and welded in a lip 3 feet 9 inches wide and 11½ inches deep. The extra ½ inch would be taken up by the roll of the machine during cutting. With the new lip in place the Traxcavator was able to use the top edge of the pavement as a perfect guide for the trench-cutting operation. The dirt was loaded into 5-yard hired dump trucks and disposed of at various spoil areas located near the job site.

Any low spots in the cutting were filled in by hand. A Galion trench roller, together with a roller attached to the motor grader, compacted the soil in the trench. Where drives or connecting roads intersected the highway, Trinidad placed railroad ties in the trench to provide access on and off the road. These were removed ahead of each paving lift until the job was completed. The contractor laid the first AC lift as soon as possible in order to eliminate the problem of rain water on the trench bottom.

An Apsco spreader handled the placement of the mix, and two Galion trench rollers compacted each of the lifts. The top lift was brought level with the old pavement. surface. Laying temperatures were 280 degrees F for the binder and from 280 to 290 degrees F for the top course.

C. & E. M. Photo

Closeup of one of the Galion trench rollers used on the paving operation. Trinidad Asphalt Mfg. Co., St. Louis, was the contractor.

Asphalt Plant

Both mixes for the job—Type B for the widening and lower resurfacing

(Concluded on next page)

C. & E. M. Photo

An Apsco paver lays down the second lift of asphaltic-concrete on a widened section of the U. S. 54 project located south of Fulton, Mo.

...a Crushing Record by:
ED LUNDIN, General Contractor
Mankato, Minnesota
with his DIAMOND "66"
ROTOR-LIFT PLANT
¾" minus material...
20 to 40% crush...
208 yds. per hr. average!
ED. LUNDIN
GENERAL CONTRACTOR
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Diamond Iron Works, Inc.
1728 Second Street North
Minneapolis, Minnesota
Gentlemen:
I could not help but write you to tell you how satisfied we are with our new Diamond No. 66 Portable Rotor Lift Crushing Plant. Last season we were crushing a job for Highway 61 on the north shore of Lake Superior and averaged 208 yards an hour on the ¾" minus material. It is our understanding from twenty to forty per cent crushing. In a pit that contained from twenty to forty per Minnesota State Highway Department show that the records of the another job of this nature that has set such a high production. This production was obtained with a minimum amount of down time. and we certainly wish to let everyone know the success that we have had in using your equipment.
Incidentally, this is the third Diamond Plant that we have operated and all of them have worked out very satisfactory.
We might mention here too that we have worked in most of the gravel pits in the south central, western, and northern sections of Minnesota and have found that we can produce more gravel per hour with our Diamond Plant than most plants of an equal size or larger that have worked in the same pits.
Again we wish to tell you how satisfied we are, and if in the future we will require another plant it certainly will be another Diamond.
Yours very truly
Ed Lundin, Contractor
by Edward N. Lundin
Edward N. Lundin
UPPER LEFT—Loading some of heaviest pit-run in the state. Note spline-shaft drive, position of power unit. Power unit is easy to get at for inspection and repair.
BOTTOM—Dozing pit-run into Diamond shovel-loading hopper. Diamond grizzly and single eccentric plate feeder keep continuous, regulated feed, make record production possible.
Diamond plants give more output with shorter material flow . . . quicker set-up and knock-down . . . greater all-round portability.
DIAMOND IRON WORKS, INC.
AND THE MAHR MANUFACTURING CO. DIV.
1776 N. 2ND STREET, MINNEAPOLIS 11, MINNESOTA

Concrete Pavement Widened, Resurfaced

(*Continued from preceding page*)

course and Type C for the wearing surface—were produced by the contractor's Hetherington & Berner 3-ton plant located about 8 miles north of the center of the project.

Trinidad had a Lorain 50 with a 1¼-yard clam charging the feed bunkers. A Cat D7 worked the stockpiles. Aggregates fed from the 125-ton 3-compartment feed bunker onto a 16 x 8 cold elevator, thence up to the first dryer. A cross elevator carried the aggregates over to the second dryer. Both dryers were identical, except for their length—24 and 30 feet respectively. They were 60 inches in diameter and fired by two Hauck jet-type fuel-oil burners.

The hot elevator carried the aggregates up to Diester 5 x 9 vibrating screens—a 1½-inch scalper, a ¾-inch, a ⅝-inch, and a No. 4 screen. From here they fed into a 75-ton 4-compartment hot bin and down into the 3-ton pugmill.

C. & E. M. Photo

This closeup of the No. 2 dryer gives a good view of the heating action of the two jet-type Hauck burners.

The plant was fully powered by electricity taken from Missouri Power & Light Co. lines. The current was stepped down from 2,300 to 1,600 volts, then down to 240 volts, with three transformers per step. The plant has a 300-kw Western Electric generator driven by a Superior diesel engine for work in areas where power lines are not readily available.

Stone was supplied by Auxvasse Stone & Gravel Co. from a nearby quarry. Missouri River Sand & Gravel Co. pumped the coarse sand from the river at Mokaine, Mo. The fine sand was obtained from a prison farm near Jefferson City. Aggregates were all supplied to the plant by truck. Shell Oil Co. supplied the asphalt from their refinery in Roxana, Ill., in 4,000-gallon trailers. It came to the plant at 250 degrees F and was pumped into two 10,000-gallon vertical storage tanks by a 3-inch Etnyre pump.

Two-and-a-half-ton batches were mixed for a minimum of 55 seconds, then dumped into the waiting trucks. Each truck carried 3 batches and delivered the mix at 290 degrees F.

Resurfacing

When the widening was completed, the old pavement was given a prime coat of RC-O cutback asphalt. An Etnyre 1,200-gallon distributor sprayed the full 18-foot width at a rate of 0.06 gallon per square yard at 120 degrees F. The prime was covered immediately with a light limestone screening applied with a spinner-type spreader. A Barber-Greene Finisher placed the two courses of blacktop in two 12-foot lanes. The lower course was a 1½-inch layer of Type B base mix. The upper 1¼-inch course was a Type C surface mix. The design of the mixes was as follows:

Material	Per Cent by Weight Type B	Type C
Stone, 1-inch	69	....
Stone, ¾-inch	....	58.5
Coarse sand	15	20.5
Fine sand	11.5	12.0
Mineral filler	....	3.5
Asphalt (70-85 penetration)	4.5	5.5

The screed on the finisher was "broken" at the center to approximate the 2-inch parabolic crown of the roadway. Two Buffalo-Springfield tandem rollers, an 8-ton and a 10-ton, finished off the surface.

Personnel

The contractor's forces included 9 men at the plant and 12 men on the road. Don J. Tripp, General Superintendent of Trinidad Asphalt, directed the work. John Wilkinson was Plant Superintendent, and Francis Hertzler, Road Superintendent.

James H. Glen was Resident Engineer on the project. V. B. Saville is District Engineer for the Missouri State Highway Department. Rex M. Whitton is Chief Engineer.

A Leakproof Nipple

A nonporous and leakproof steel combination nipple is made by Hose Accessories Co., Lehigh Ave. at 17th St., Philadelphia 32, Pa. The Le-Hi 650-SC of one-piece steel tubing comes in all standard sizes from 1 to 6 inches. The company claims that the nipple will not scale.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 711.

Catalog on Trailer Hoists

A 4-page illustrated catalog describing cam-and-roller and telescopic hoists for dump trailers has been released by Gar Wood Industries, Inc., Wayne Division, 36253 Michigan Ave., Wayne, Mich.

According to the company, the cam-and-roller hoists mean longer life to the pump because they maintain uniform oil pressure. Dumping strains on the hoist cylinder are reduced because the rigid stress-transferring connection is eliminated. The telescopic hoists are mounted outside to eliminate problems of chassis interference.

The F8C cam-and-roller hoist handles 15 tons on a 16-foot body while the F77C cam-and-roller has a maximum payload of 25 tons on an 18-foot body. The telescopic TU35 has a 186-inch stroke and handles a 30-ton load.

This literature may be obtained from the company, or by using the Request Card that is bound in at page 18. Circle No. 803.

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CHICAGO 10, Ill. 10-18 W. Hubbard St.	INDIANAPOLIS 2, Ind. 309 N. Capitol Ave.	PHILADELPHIA 6, Pa. 311 N. Randolph St.	SYRACUSE 2, N. Y. 1606 W. Genesee St.

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Construction's Role In the National Life

AGC Managing Director Addresses ASCE on the Development Of Construction by Contract in America

• AT a joint session of the Associated General Contractors of America, Inc., and the Construction Division of the American Society of Civil Engineers last month, H. E. Foreman, Managing Director of the AGC, addressed the Centennial Convocation of the ASCE.

After paying tribute to the teamwork between civil engineers and contractors which has done so much to make the United States a leading nation of the world, Mr. Foreman approached the subject which had been assigned to him —"Development of the Construction Industry and the Contract Method in the United States"—a vast theme, to which little more than an introduction was possible.

Construction Through The Ages

The history of the human race, said Mr. Foreman, is in large part the story of man's struggle with his environment. In that struggle the basic needs of men and women have been food, clothing, and shelter. Of these the most durable is shelter. As far back in history as archaeologists have been able to find traces of human life, they have also found evidence of construction. Presumably one of the first wants of man was to provide shelter in which to live.

But as soon as civilizations began to develop there arose the need for structures and facilities for the production of goods, trade and commerce, transportation, education, religion, the development of natural resources, public buildings, safeguards to health, life, and property, and the many other types of facilities which our modern civilization has found necessary or desirable.

Little is known about the construction industry in the ancient world when some of the wonders of early times were built. But in ancient Greece, when many structures were built which are still famous today, Greek law and custom prescribed relationships between the contractors and the Government which are strikingly similar in principle to the contractual relationships which prevail today. The contractors were required to work continuously, to hire sufficient numbers of qualified workmen, and to guarantee quality of performance. There were penalties for delays or failure to complete the work. Payments were made in installments as columns or pediments rose to completion. The precedent was set that a percentage of the contract price be retained until the project was completed.

It was during the days when Imperial Rome ruled a great portion of the world that construction companies much as we know them today came into being. Their Greek predecessors worked independently in small groups. But the Roman contractors formed large companies to undertake the huge construction projects of the time. They came to realize the complexity and the risks which were involved. They believed that by incorporating many talents under a single management the risks could be minimized and better controlled. The Romans who undertook whole projects were awarded their contracts under a bidding system similar to that which exists today.

After the fall of Rome the construction industry as such seems to have generally faded from view. Construction of a durable nature that was continued during the medieval days seems to have been carried on by the Church and was concentrated on the construction of cathedrals, abbeys, and works of that nature.

In Egypt, where it has been estimated that there were barracks for 4,000 workmen to prepare the stone for the great Pyramids, and in Mesopotamia, where there were great irrigation projects, much of the actual construction work was done by slaves, who were often prisoners of war. This seemed to prevail also in Greece and Rome, although some of the more skilled workers were freemen. The designers, who were also responsible for execution of the work, were men in high position in the courts.

What little is known about contractors of medieval England points to their rising out of the ranks of free masons. Training was later specialized to develop two types of masons: one skilled in actual stonework and the other who planned and designed buildings. The former apparently was the forerunner of the modern contractor; the latter, of the modern architect.

Rules for the mason's craft were drawn up in London in 1356. One of the most interesting rules provides for a guarantee of ability and responsibility. As described by Martin S. Briggs in his "A Short History of the Building Crafts":

"Anyone undertaking a contract was to come before the good man for whom he was going to work, with four or six experienced masons who should swear that he was capable of doing the job, and that if he failed they would themselves complete the work on the same terms."

In early England, the builder was the master mason who fulfilled the three functions of designer, builder, and master of the works. In the latter capacity he supervised the operations to make certain that the work was done

(Continued on next page)

H. E. Foreman

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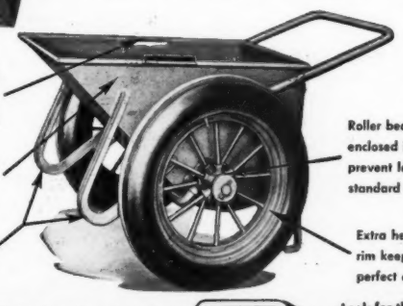

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Construction's Role In the National Life

(Continued from preceding page)

properly and the workmen were paid according to their ability.

Development of Construction Industry

While there has been developed in this nation a construction industry which is unique, just as the nation itself is unique, its principal roots came from England.

The early methods, materials, contract forms, and practices of the industry came primarily from England and from the other European countries from which the settlers came.

Written contracts were in use in the early days. Sumner C. Powel has reported in the Journal of the Society of Architectural Historians that the first full contract recorded in the town book of Sudbury, Mass., in 1642, provides in part as follows:

". . . the said Ambrose doth promise to build a sufficient cart bridge over the river three foote above highwater and twelve feet wide from the one side of the river to the other, provided that the towne doth fell & cross cutt the tymber and saw all the plank and carry it to place and when it is ready framed, the town doth promise to help him to raise it."

In another contract in Sudbury, dated February 17, 1642:

"It is agreed between the townemen of the towne on the . . . (one part) . . . and John Rutter on the other part that the said John . . . for his parte shall fell, saw, hew a frame house for a meeting house thirty foote long, twenty foote wide, eight foote between joynte, three foote between studde, two cross dorments in the house, six clear story windowes with four lyghts a peece and foure with three lyghts a peece and to ententise between the studde which frame is to be ready to raise the fourth weeke in May next.

"And the towne for their parte do covenant to draw all tymber to place and to help rayse the house being framed and allsoe to pay to the said John Rutter for the said house six pound, that is to say three pound to be paid in corne at three shillings a bushell or in money in and upon the twenty-seventh day of this present month and the other three pounds to be payd in money, corne or cattle, the corne and cattle to be prized by two men of the town, one to be chosen by the towne and the other to be chosen by John Rutter, and to be paid at the time that the frame shall be by the said John Rutter finished."

The American construction industry did not get its real start until after the Revolution. England had used the American colonies primarily as a source of raw materials for its factories. Much of what was built during colonial days was done by the British or under their direction. It was not until the United States became independent that it set out by its own efforts to become self-sufficient.

After the American Revolution there was the immediate need in this country for structures to house manufacturing processes so that goods formerly supplied by Great Britain could be produced at home.

The American Peoples Encyclopedia reports that "the history of construction in the United States reflects in an exaggerated form the forces of industrialism which combined to cause fundamental changes in building, and to constitute the activity as an 'industry' in its own right throughout the Western civilization."

As a result of the need for large industrial buildings, the Encyclopedia reports, the amateur designer and the anonymous builder yielded to the professional architect and workman, and building design changed to meet new needs. Techniques and methods still followed earlier procedures. But the needs of factories for large rooms, floors and walls of great strength to support heavy machinery, illumination, temperature control, ease of mobility for materials, and personnel demanded more than could be supplied by previous structural theories and customary techniques. These demands led to the development of new techniques.

A decisive point in the history of American construction, the Encyclopedia reports, was the elevation of the mechanic to the rank of engineer, with a professional status distinct from that of the architect. The Encyclopedia adds: "The engineer's dedication to technology assured the rapid development of new methods and new processes to which subsidiary industries could contribute an increasing share."

Early American Construction

Some of the construction work in the early days of the nation, during the first half of the last century, gives an indication of how the industry developed, and how important it was to the opening up and development of the country. For more than two hundred years after the early settlements in Virginia and New England, the rivers were the principal highways and Colonial America expanded along those waterways, first up the rivers flowing into the Atlantic and then down those flowing to the Lakes and the Mississippi.

But under the pressure of continued and rapid expansion these natural means of transportation and communication became inadequate, and it became essential to provide access to that large portion of America removed from the coastline and principal waterways. So canals were built to furnish a route for settlers to go west and make possible their livelihood after they got there. During the early decades of the nineteenth century, civilization spread rapidly along the rivers and into the wilderness through a spreading network of canals.

The first canal begun in this country was the Dismal Swamp Canal in Virginia. It was started in 1787 and is still the oldest canal in use in the United States. The first canal to be completed in this country was built at South Hadley, Mass., from 1792 to 1796. It was financed privately with funds raised partially by public lottery. In England and the United States this seems to have been a popular way to raise funds for canals.

The first major canal was the Erie Canal, which was opened to traffic from the Hudson River to Buffalo in 1825. This canal paid its own expenses and all those of New York State for many years, and millions of its surplus earnings were later used to develop the state's early railroad lines. That canal was one of the principal reasons for the growth and development of New York City as a major port.

Early canals in this country were built by private stock companies because the authority of the Federal government to construct canals or highways was a bitterly contested political issue. The contract method of construction was used. Contracts were usually for short stretches enabling many contractors to work on one canal. At one time there were 6,000 bids for contracts to be awarded on 110 sections of the Ohio canals, varying in length from 2,000 feet to 14 miles depending on the number of locks or other structures per section. This work attracted not only local bidders, but those who had worked in other states.

Despite floods, malaria, labor shortages, and a lack of trained engineers, contractors built more than 4,500 miles of canals in the United States from 1800 to 1850 at a cost of more than $200,000,000. Ohio alone had a canal system almost 1,000 miles in length.

By joining the inland areas with the Atlantic, the canals launched the development of the Middle West. The economic benefits were incalculable. Examples such as the following from Ohio are typical: From 1820 to 1840 population increased from 581,000 to more than 1,500,000. Property value increased from 59 million dollars in 1825 to 440 million dollars in 1850. Also the price of flour increased from $3 to $6 a barrel between 1826 and 1835, and the price of wheat was trebled between 1820 and 1832.

The need for a comprehensive system of adequate highways was foreseen more than 100 years before it approach-

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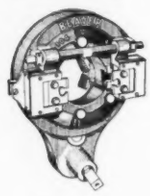

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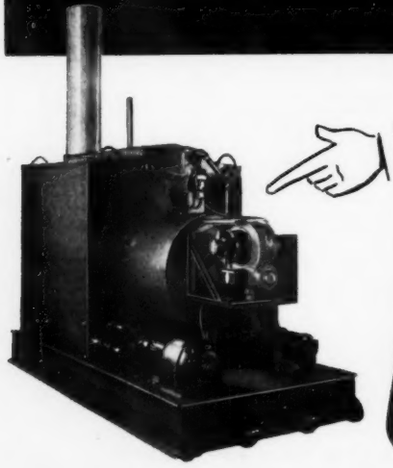

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ed a semblance of reality. There has been a complete cycle in the relation of the Federal government to highway construction during the nation's history.

First the Federal government participated directly in the work. Then it retired and turned the work over to the states. They in turn left it to counties or other local authorities until New Jersey reversed the trend in 1891 by state aid. The current Federal-Aid system was established in 1916.

The importance attached to early roads is evidenced by the Act of 1802, which admitted Ohio to the Union. This contained a provision setting aside 5 per cent of the net proceeds from the sale of public land in that state for the construction of public roads leading from the navigable waters emptying into the Atlantic to Ohio's border and through the state.

One of the first roads built by the Federal government was financed by funds resulting from the sale of public lands in Ohio which amounted to over $600,000 by 1806. In that year Congress appropriated $30,000 of that sum and authorized the President to appoint a commission of three "discreet and disinterested citizens" to lay out a road from Cumberland, Md. This was the beginning of the famous Cumberland Road, now U.S. 40, which had been strongly advocated in 1785 by George Washington, who, as a Colonel in the British Army in 1754, had widened the trail at Wills Creek, Cumberland, Md., to allow passage of his artillery.

On May 8, 1811, Henry McKinley, a Maryland contractor, signed a contract with Albert Gallatin, Secretary of the Treasury, for the first section of that road starting in Cumberland and "ending at a place on said road two miles and two hundred and forty-six perches distant." A perch was 16.5 feet or the equivalent of a rod in length. For that he bid and was to be paid $21.25 for each perch.

The contract contained essentially the same features as present-day contracts. It was publicly advertised and awarded to the lowest bidder; a completion date was established with a penalty for non-fulfillment; provision was made to assure payment to subcontractors and suppliers, and a schedule of partial payments to the contractor was set.

On or near the Cumberland Road two important events in road building occurred: the first macadam surfacing in the United States was laid on an 11-mile stretch between Boonsborough and Hagerstown, Md., in 1823, and the first cast-iron bridge was built in Brownsville, Pa., in 1839; both by contractors.

Construction of the Cumberland Road was supervised by the Corps of Engineers.

Another great factor in opening and developing the nation during the early 1800's was the railroads. Valuable as the canals were, there arose pressing needs for additional methods of transporting goods from the Middle West to the East across the mountains.

The first railroad to be chartered and built in the United States was the Baltimore & Ohio, the first stone of which was laid on July 14, 1828. Construction was begun on the route between Baltimore and Wheeling, which had been surveyed by the U.S. Topographical Engineers, now the Corps of Engineers.

The value of the contract method of construction was apparent to the founders of the railroad. On July 14, 1828, notice was publicly given that between August 1 and 11 proposals would be received for the grading and bridge construction on the first 26 sections from Baltimore to Ellicott's flour mill, a distance of 12 miles away. Contractors were at work on all sections by October 1.

Value of the use of contractors is indicated by the second annual report of the President of the railroad, who stated in part:

"The directors are not aware that any prejudicial consequences resulted from the short notice which preceded the first letting, or that greater competition would, at that time, have caused any

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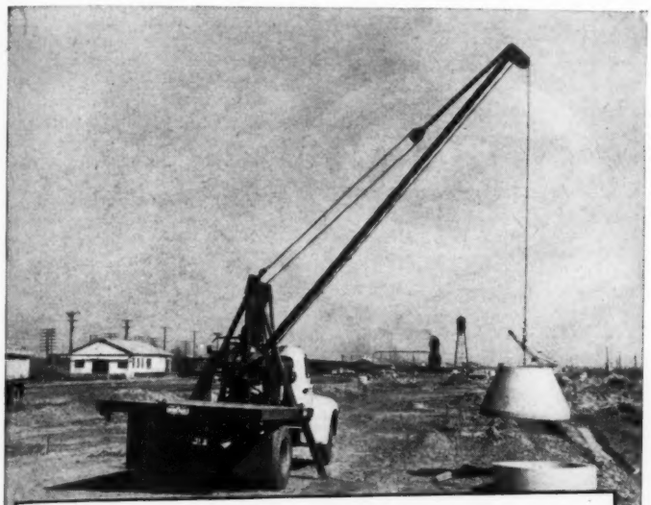

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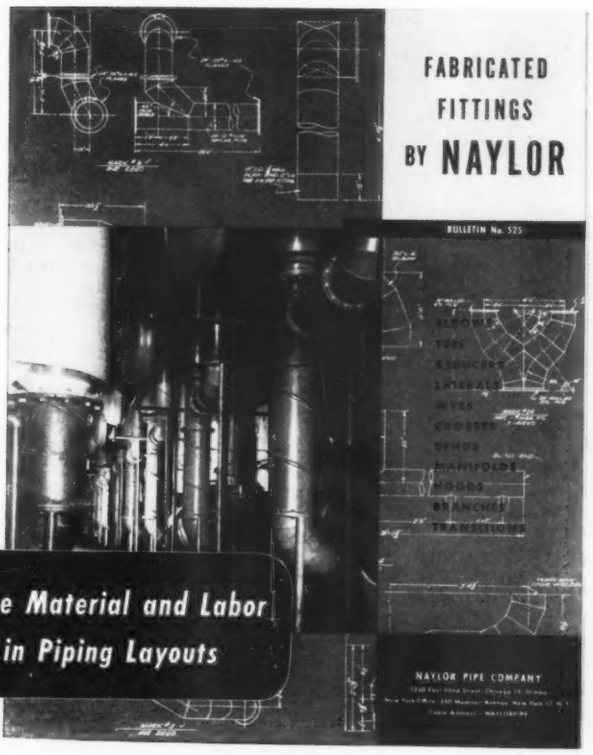

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Construction's Role In the National Life

(Continued from preceding page)

material change in the contract prices, which, although they are believed sufficient in every case to insure the contractors against loss, are not thought to be generally higher than has usually been paid under similar circumstances.

"So great, however, are the increased facilities now experienced from the improvements which have been introduced by the contractors on several sections by means of temporary railways for the removal of earth, that a great reduction of cost will accrue to the contractors. The profitable results of these improvements will be felt in subsequent contracts."

This prediction proved true, prices being lower on the next lettings, and the ingenuity of contractors reduced the cost of the entire line.

After the Civil War the new industrialism expanded throughout the country with lightning rapidity. The great fire in Chicago in 1871 accented the need for fireproof construction. The availability of steel in the middle 1880's revolutionized building construction because the steel framework could support the weight of the building and walls no longer had to be so heavy or so thick.

In the 1870's portland cement came into being and with it came a great influence on design and construction in nearly all fields.

First Steel-Skeleton Building

It was in Chicago in 1885 that the first building with a steel skeleton was built, revolutionizing building construction. It was the Home Insurance Building on the northeast corner of South LaSalle and West Adams Streets. Heated arguments which developed in later years as to the validity of this claim were settled in 1931 when the building was torn down. Three committees of engineers and architects investigated and agreed that it was in fact the first building to utilize skeleton construction as the basic principle of its design.

One of the greatest contributions America has made to construction has been in the development and use of machinery. While the first steam shovel was built in 1837, the greatest development in machinery was in the latter part of the nineteenth century, and during this century. Horse-drawn scoops were used as early as 1805, but the development of the powerful scrapers did not come until this century.

The Fresno scraper, the horse-drawn forerunner of the bulldozer, was patented in 1882. While steam tractors were used in agriculture as early as 1890, it was not until 1903 that the first crawler tractor was manufactured. The use of low-pressure heavy-duty tires for construction equipment did not come into use until the 1930's after the contractors on the Bay Bridge in San Francisco had used airplane tires on some of their equipment.

In reviewing the past 100 years of construction, said Mr. Foreman, one cannot help but be impressed by the tremendous changes and the tremendous strides which have been made during that period.

There were marvelous construction projects in the past. But these, such as the Pyramid of Cheops, which took 30 years to build, and has, incidentally, half the volume of Boulder Dam which was built in five years; the 4,000-mile Inca highway which rises to heights of 15,000 feet; the Chinese Wall; and hundreds of others, are particularly remarkable for having been built almost entirely by hand.

A hundred years ago most American construction was by hand, and aside from some use of cast iron or wrought iron little change or improvement had been made from the past.

Today, such challenges as the unprecedented dams, irrigation, flood-control and power projects of the West are taken in its stride by the construction industry. In just one phase of the industry, the building of highways, it is worthy of note that construction contracts awarded by state highway departments throughout the country in one year, 1951, were for a total of 54,650 miles.

The Early Contractor

There is evidence that from the earliest times after the settlement of some of the American colonies, it was the practice to have construction performed by contractors who had written contracts.

When buildings were primarily of wood, or brick and stone, the contractor generally was the master mason or master carpenter. But when structures became more complex; when steel, concrete, and other new materials came into use; when plumbing, heating, lighting, and later, elevators were incorporated in buildings, and when new

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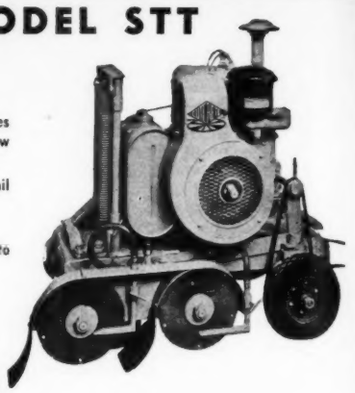

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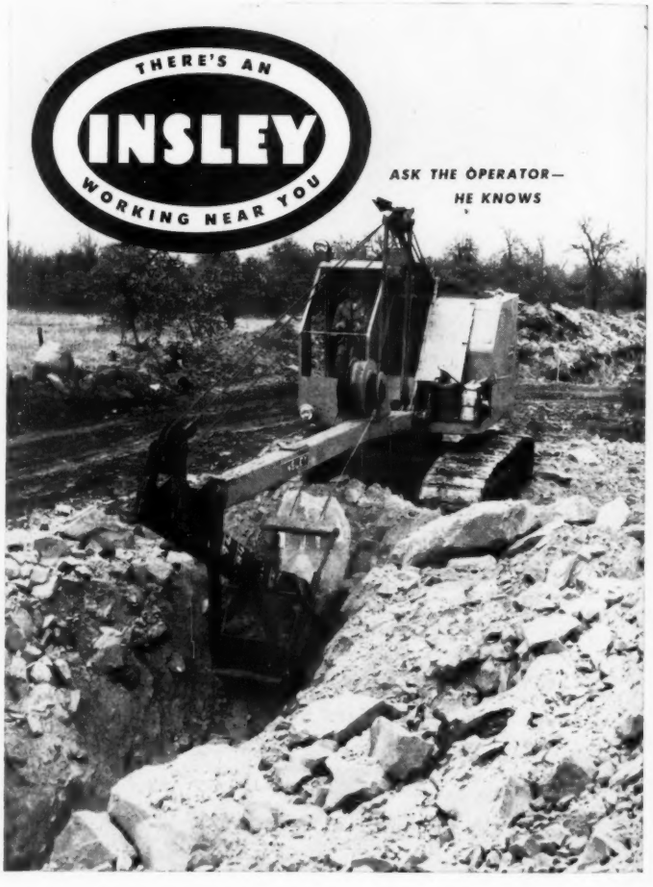

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machinery came into use it was no longer possible to have all of the work under the direction of the mason or carpenter.

When the industry was undergoing its period of fast growth and change after the Civil War there were apparently also growing pains in the organization of the construction industry. It became necessary to develop some kind of an organization which could combine and coordinate the various skills which were required for these new features of building.

While more research needs to be done on this turning point in the construction industry's history, it appears that somewhere during the middle 1880's the general contractor, such as we know him and his organization today, first becomes recognizable.

Before the bona-fide general-contracting firms were organized to take complete and undivided responsibility for the execution of a project, it appears that sometimes the architect or engineer who designed the project also coordinated the work of the various individual contractors and supervised their operations. Apparently this function was sometimes fulfilled by the owner or a representative for the owner such as the Corps of Engineers in the case of Government construction.

Early contracts were much the same as now, calling for guaranteed quality, penalties for delays or failure to complete the work, assurance that suppliers, subcontractors, and labor would be paid, and periodic payments with a percentage retained for payment on completion and acceptance. Most public works contracts seem to have been awarded after competitive bidding, as is the custom today, and they were at firm prices or so much per unit. In private work, there appears to have been some use of cost-plus-10-per-cent contracts, but that type of contract has been almost entirely replaced by the cost-plus-a-fixed-fee contract.

There is considerable evidence that in earlier days work privately financed was undertaken and completed without formal contract; that much of it proceeded under verbal understanding or was based on letters.

Construction Industry Today

Mr. Foreman said that a good way of bringing home the development of the construction industry in the United States is to glance at its present activities.

During 1951 the construction industry was the largest single industry in the United States. The volume of new construction put in place was more than 31 billion dollars, according to the revised estimates of the Departments of Commerce and Labor. In addition approximately 9 billion dollars' worth of maintenance and repair operations was performed to bring the total volume of construction activity to 40 billion dollars. This exceeded the total value of agricultural production, which normally has been the greatest industry in the nation. Nearly one dollar in every eight created in end products and services in the United States in 1951 was a construction dollar.

Throughout the year an average of 2¼ million men were employed each month by general contractors and subcontractors on the site of construction projects. For each man working at the site, from two to four other jobs were created elsewhere in the production or transportation of materials and in the performance of services for the industry.

Of this construction, more than 21 billion dollars was privately financed, and more than 9 billion dollars was invested in public funds. Of the private funds invested, almost 11 billion dollars went into residential construction; more than 5 billion dollars was invested in nonresidential building for industrial, commercial, religious, educational, health, and other institutional purposes, and more than 3 billion dollars was for public utilities. Of the public funds, more than 3 billion dollars was invested for educational and other public institutions; approximately 2½ billion dollars for highways; almost 1 billion dollars for conservation and development of resources, and more than 1 billion dollars for military construction.

During the first six months of 1952 another record of nearly 15 billion dollars in new construction was established. There is the possibility that if materials are available during the balance of the year another annual record of more than 40 billion dollars in construction will be established. The impetus for a large volume of construction this year is from military, industrial, and public-utility construction.

These figures on construction activity are too big for most of us to comprehend readily, said Mr. Foreman. But they do clearly indicate that the construction industry is performing a tre-

(Continued on next page)

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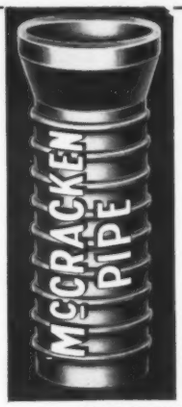

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Construction's Role In the National Life

(*Continued from preceding page*)

mendous amount of work for the nation and all of its communities.

Construction now is not only a huge industry, but its work is fundamental to the growth and development of the nation and its communities and it plays a part in practically every aspect of our civilized life.

The AGC uses the phrase "America Progresses Through Construction". Members believe that to be true, and believe, also, that the role of the construction man, like that of the engineer, is little understood by the general public.

One of the reasons the United States has become a great nation is because there has been not only the genius, the foresight and the courage to develop new industries and better ways of developing its resources, but also because there has been a progressive and ever-developing construction industry which could fulfill the nation's needs for physical facilities—an industry which has striven to retain its flexibility.

Essentially it must be broadly dispersed in all phases to meet local needs promptly. Through joint ventures the construction industry has learned to put its units together in any combination necessary to do the job. It must be present in all its phases at all times in every community if the full function of the industry is to be performed.

While there are no accurate statistics on the volume of construction in the early history of the nation, a brief reading of history will indicate what a tremendous role in the country's growth has been played by the construction industry in building for many purposes: industrial, conservation and development, transportation, commercial, residential, community, governmental, health, educational and institutional, national defense, civil defense, and disasters. The industry has also kept pace in providing facilities for recent developments in aviation, electronics, and atomic energy.

These are some of the reasons why all of those men and women who are a part of the construction industry in one capacity or another can and do take pride in their accomplishments.

Not All Construction Is New

New construction is probably the most spectacular function of the construction industry, but the industry has many other jobs. In order to be most useful the physical facilities of the nation which were built by the industry also need to be maintained, repaired, and remodeled from time to time to fit new conditions. Nearly a quarter of the industry's work is for this purpose.

In times of disaster such as earthquakes, tornadoes, explosions, floods, and heavy snows, the damage needs to be repaired and water, light, gas, and other facilities need to be restored to operation. This is another task of the construction industry. On occasions such as the explosion at Texas City, the tremendous snows in the Great Plains states, the floods in the Kansas City area, and other emergencies, contractors and others in the industry have mobilized immediately in cooperation with civic authorities and started their workmen and their machines to clearing debris and repairing damage. Some time later they took the time to consider what should be the proper compensation.

The AGC has cooperated with the Federal Civil Defense Administration and has submitted a comprehensive plan on how the facilities of the industry can best be mobilized in the event of an emergency, and many other organizations in the industry have done likewise.

In 1947 the Army initiated its Affiliation Program. In this program, reserve units, in which each man is specially fitted for his military assignment by his civilian work, are recruited and trained for call to active duty when necessary.

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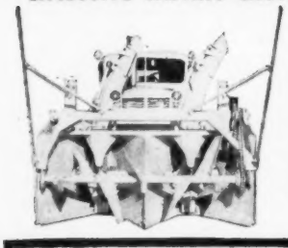

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The AGC was asked to cooperate with the Corps of Engineers in sponsoring and recruiting reserve construction units. So far 76 units have been sponsored and 21 have been called to active duty. Two have been engaged in Korea where they have performed the outstanding engineering feats of that campaign. Many engineers, architects, and others in the industry have joined these units. There are also two units in the European Theater.

These activities of the construction industry serve to emphasize why the industry is so fundamental to the welfare of the nation and its communities.

National Defense

Construction is as important to the national defense as it is to the peacetime development and progress of the nation. For World War II the construction industry completed work valued at more than 49 billion dollars. This work constituted at that time the world's greatest single construction program, and it represented an expenditure of approximately $400 for each man, woman, and child in the country. The war was actually won by fighting men, but they had to be supported by the products and services of American industry. One of those industries was construction.

Camps virtually as complete as cities had to be set up before men could be trained and sent overseas. Factories had to be constructed before airplanes, tanks, guns, munitions and other weapons of war could be produced in quantities sufficient to overwhelm the enemy. Yards had to be built before a bridge of ships and a seven-ocean navy could be launched. Bases had to be constructed before attacks could be directed at the enemy.

It was necessary that this construction work be completed before many other parts of the war program could be undertaken. Because of this, construction was the first major industry to attain large-scale defense and war production. By the time of Pearl Harbor it was converted 75 per cent to war work, and at one time there were more men mobilized on construction work for the Army than were in the Army itself.

Had construction failed in any part, other phases of the war effort would have been hampered, perhaps disastrously. But there were no bottlenecks in construction; the work was completed at unprecedented speed. The speed cost money, but by helping to end the war it saved lives.

As members of the armed services, construction men, with their methods and machinery, helped to develop the capacity for building airfields, docks, railroads, pipelines, and for moving millions of tons of supplies at speeds never before attained in military operation. The nation's capacity to construct both at home and in combat areas was such that the wartime Chief of Army Engineers was able to report:

"By the war's end it was evident that American construction capacity was the one factor of American strength which our enemies most consistently underestimated. It was the one element of our strength for which they had no basis for comparison. They had seen nothing like it."

Should there be another war and the United States be subjected to bombings or other catastrophes, the construction industry will be immediately available to clear debris and restore essential facilities to use in the minimum time. There is no other way in which such work can be done except by the construction industry.

Construction's Important Role

In conclusion, Mr. Foreman said that the construction industry throughout the history of the United States has had, still has, and always will have a tremendously important part in the development, growth, and progress of the nation and its communities, and will serve as a medium through which investment can be made in facilities which serve people.

Construction has kept pace with and helped in the development of practically all other industries, and is able to make use of their discoveries to build constantly better facilities with greater speed and efficiency.

Labor has also kept pace with the development of new materials, new and greater designs. Workmen have had to be continually trained in new techniques while preserving their ancient skills. This has been done under a comprehensive program. American workmen have fully measured up to the challenge.

The industry is of huge size, and produces an amazing variety of products under every conceivable circumstance, yet its methods and internal organization have developed, often with growing pains, until they are of such flexibility that the industry can execute any structural need of the people any place in the world.

By experimentation through the years and now by cooperation between such organizations as the American Society of Civil Engineers, the American Institute of Architects, The Associated General Contractors of America and many others, there has developed a type of joint-cooperative relationship within the construction industry which best fits its purpose, and which permits fair and equitable treatment of all those connected with construction operations.

As general contractors, who are the logical development in the industry to fulfill the need for organizations to take complete responsibility for the construction of projects and to correlate all of the skills, materials and machinery required, the AGC looks forward, said Mr. Foreman, to an even greater century in partnership with engineers.

The engineer's qualities of skill, imagination, and courage have been complemented by the initiative of the contractor in devising new methods and together they form a team which continues its advance toward an ever-expanding vision of a greater United States of America.

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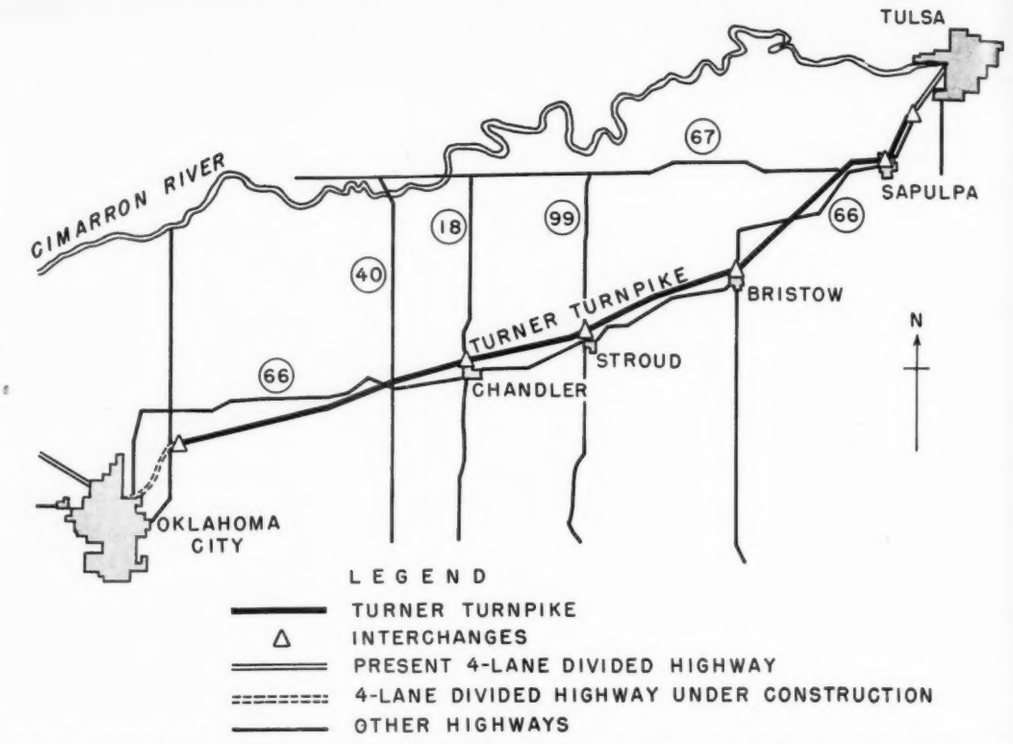
Superhighway Crosses Oklahoma

New Turner Turnpike Has Two 24-Foot AC Roadways on Selected Subgrade

• A NEW $38,000,000 super arterial highway, the Turner Turnpike, will soon connect Oklahoma City, capital of the state of Oklahoma, and Tulsa, oil capital of the world. Currently under construction and planned for completion in early 1953, the 88-mile highway parallels U. S. 66, main east-west highway across the state. Transcontinental travelers will save almost a full hour of driving time between the two cities by taking the new route. The slight grades and long easy curves will make driving easier and safer, too.

When completed, the turnpike will have two 24-foot roadways separated by a 15-foot landscaped center mall, and 12-foot paved shoulders. Underpasses, overpasses, and trumpet-type interchanges will eliminate all cross traffic. Roadside development will preserve the national beauty of the area. The Turner Turnpike will be the most modern highway in the southwest, engineered for safety, comfort, and economy.



The 88-mile Turner Turnpike is expected to save transcontinental travelers almost a full hour of driving time between Oklahoma City, capital seat of the state, and Tulsa, oil capital of the world.

History

The Turner Turnpike, named after Roy J. Turner, former Governor of the state and one of the foremost advocates of good roads, is the first project of the Oklahoma Turnpike Authority. The Authority was created by the State Legislature in 1947 through the efforts of the Governor and civic leaders in the state. These men had long recognized the need for an up-to-date road to carry trans-state east-west traffic. Tulsa and Oklahoma City are booming communities, each now past the quarter-million mark in population. Moreover, the route between them links the east and south-Atlantic states with the southwest and Pacific-coast states. New defense activity, growth of home industries and importation of new in the region, and expansion of ranching and farming have all increased traffic.

Route 66, the existing free road, is 25 to 35 years old in places. Though widened in some areas to 24 feet, it is essentially an 18-foot road. Curves are sharp, grades are up to 6 per cent, and traffic is as high as 9,000 vehicles per day. The State Highway Department is, and has been, doing its best to improve the old road. Its efforts are hampered, however, by the narrow right-of-way and the traffic on the route through about a dozen cities and towns. All things considered, U. S. 66 alone was entirely inadequate to the auto travel in this area.

Over-all Design

Initial work on the design and engineering phases of the new route started back in 1950. De Leuw, Cather & Co., Chicago, Ill., is the general consulting-engineering company for the Authority. In addition to work performed at its Chicago office, it set up field offices at Oklahoma City, Stroud, and Sapulpa, and associated itself with eight Oklahoma engineering firms: Benham Engineering Co.; Fell & Wheeler Engineering Co.; Wyatt B. Hendrick Engineering Co.; Lee Hendrix Engineering Co.; Hudgins, Thompson, Ball & Associates; Pate Engineering Co.; Toler Engineering; and Wood & Craig Engineering Co.

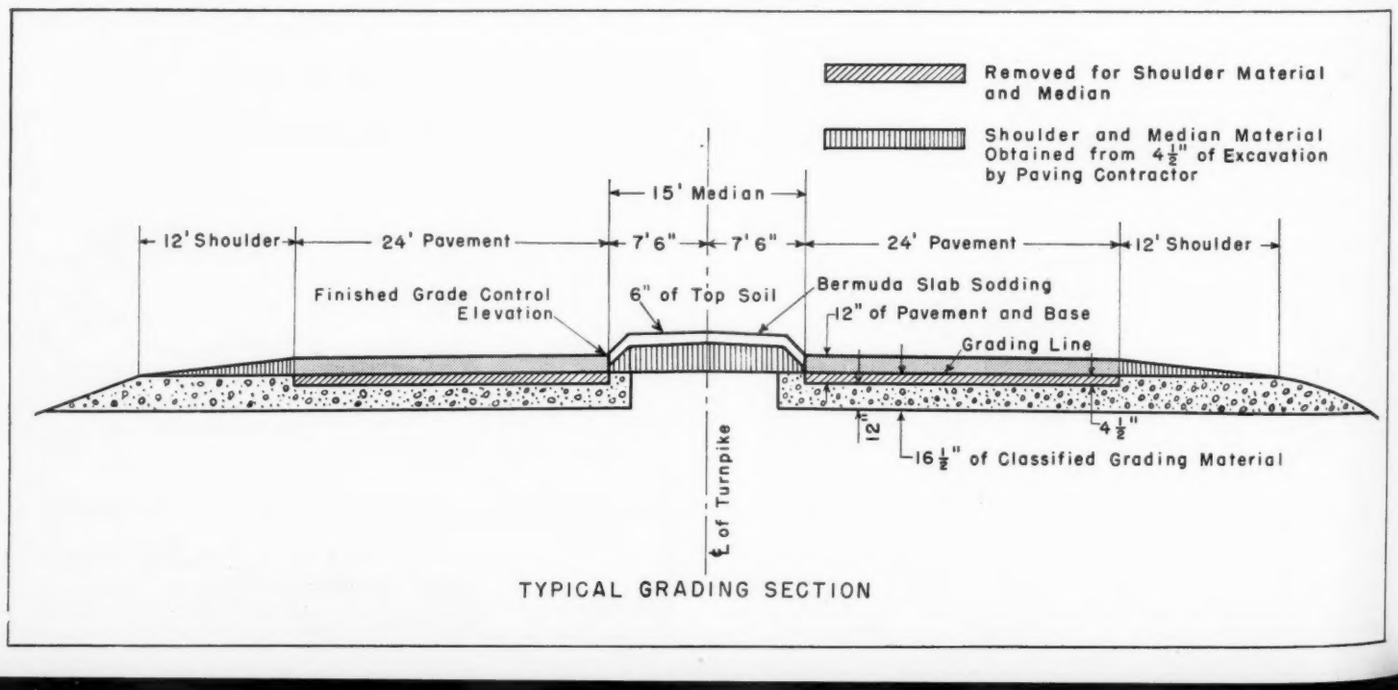
The turnpike begins, or ends, depending which way you look at it, outside the corporate limits of both Oklahoma City and Tulsa. Four-lane divided highways, now under State Highway Department contracts, will tie the turnpike into other arteries at each of the cities. These freeway terminal connections will permit the motorist to enter or bypass either of the cities.

The turnpike itself is 88 miles long. There will be four interchanges providing access to north-south highways and communities adjoining the turnpike. These will be at Chandler, Stroud, Bristow, and Sapulpa. The interchanges are of the trumpet type, to eliminate direct crossing of traffic and conflicting turning movements. The enabling legislative act required that the turnpike pass within a half mile of these communities and thus to some extent dictated the route the roadway would take. Actually the turnpike follows the historic Indian Trading Trail for the most part.

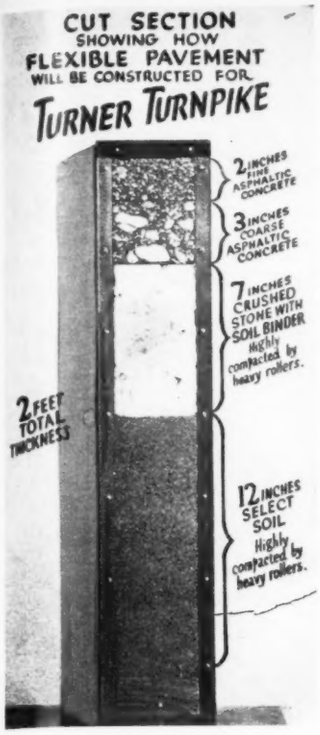
The design of the 70-mph road embodies the highest engineering standards. The right-of-way is 200 to 400 feet wide. Grades are a maximum of 3 per cent. Except for three 1-degree 30-minute curves, all changes in line are limited to 30 to 45-minute curves. A 5-foot-high hog-tight wire fence will separate the highway from abutting property and limit access to the designed entrances and exits. All fill slopes up to 100 feet in height are 4 to 1; above this they will be 2 to 1. Backslopes are 2 to 1.

Roadway Design

The crowned width of the turnpike



TYPICAL GRADING SECTION


CUT SECTION
SHOWING HOW
FLEXIBLE PAVEMENT
WILL BE CONSTRUCTED FOR
TURNER TURNPIKE
2 INCHES FINE ASPHALTIC CONCRETE
3 INCHES COARSE ASPHALTIC CONCRETE
7 INCHES CRUSHED STONE WITH SOIL BINDER Highly compacted by heavy rollers.
2 FEET TOTAL THICKNESS
12 INCHES SELECT SOIL Highly compacted by heavy rollers.

roadbed is 87 feet. This provides for two 24-foot parallel roadways, a 15-foot raised median, and 12-foot paved shoulders. The median strip has a 2 to 1 slope for the outer 9 inches and flattens to a 24-to-1 slope at the highway center line. The pavement slopes away from the median ⅛ inch to the foot. Shoulders slope ⅝ inch to the foot.

Grading contractors will carry their section to an elevation 7½ inches below the finished grade of the turnpike. The Authority requires that the top 16½ inches of the grading section be constructed of a selected subgrade material: the lower 6 inches to have a plasticity index less than 10 and a California bearing ratio of 8 or more; the upper 10½ inches to have a PI less than 9 and a CBR of 10 or more. All of this material is to pass a 2-inch sieve.

The paving contractors will remove 4½ inches of this material, under the paving areas only, and place it on the median strip and the shoulders. (See diagram.) The material on the shoulders will then be asphalt-stabilized to a depth of 6 inches across the full 12-foot width of the shoulder and surfaced. The advantages of this area are that it provides a uniform grading section, and in effect stockpiles the material needed for the stabilized shoulder right on the roadway.

The removal of 4½ inches of material under the paving area leaves 12 inches of selected subgrade material under the 12 inches of paving. The paving will consist of a 7-inch stabilized-aggregate base course and a 5-inch hot-mix hot-laid asphaltic-concrete pavement 24 feet wide. The base will contain a minimum of 40 per cent crushed rock, all passing a 2-inch screen, and sufficient soil binder to stabilize the aggregate. The AC paving will be placed in two courses: a 3-inch lower course containing a maximum 1½-inch stone and a 2-inch upper course containing a maximum ¾-inch stone, both with 85-100 penetration asphalt.

Traffic-lane stripes will be reflectorized.

Alternate Bids Sought

During the early stages of design planning there was a certain amount of controversy over the minimum design loading and the type of pavement to be used for the turnpike. The Authority resolved the former problem by selecting a minimum standard of 28,800 pounds as the axle load which the highway was to bear. The problem of type of pavement was not so easily answered, however. For this reason the turnpike engineers, and their consultants, offered five alternate acceptable designs for bidding. Each of the designs was analyzed by two or more acceptable methods and found to provide a load capacity greater than that required. A detailed study of maintenance records of state highway departments in various sections of the country indicated that all designs were also equal from a maintenance-cost standpoint.

The alternates were an 8-inch portland-cement-concrete pavement on a 4-inch sand base; a 9-inch PC concrete on a 3-inch base; and 5-inch, 6-inch, and 8-inch asphaltic-concrete pavements of 7, 6, and 4-inch flexible bases respectively. On every section let, there were one or more bids on all alternates, and in every case the 5-inch AC pavement with a 7-inch base was low. The small expense involved in making alternate designs was more than offset by the savings in bid prices.

Erosion Control

Though the turnpike engineers plan no specific landscaping at this time, they have provided for a number of erosion-control measures. Relatively flat sideslopes are the first measure: 4 to 1 or 2 to 1 for fills and 2 to 1 for cuts. Fill slopes will get 4 inches of topsoil, fertilizer, and Bermuda tuft planting. The fertilizer will be a commercial standard with 5 per cent nitrogen, 10 per cent phosphoric acid, and 5 per cent potash. Turnpike engineers believe native

(Concluded on next page)

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Single cyl. 3 to 9 H.P.

2-cylinder 7 to 13 H.P.

V-type 4-cyl. 15 to 30 H.P.

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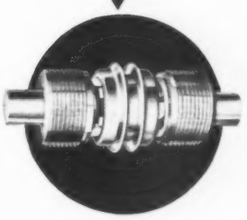
A 7111-½-R-5

Eliminates Bottlenecks



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314 Catherine Street, Rockford, Illinois, U.S.A.

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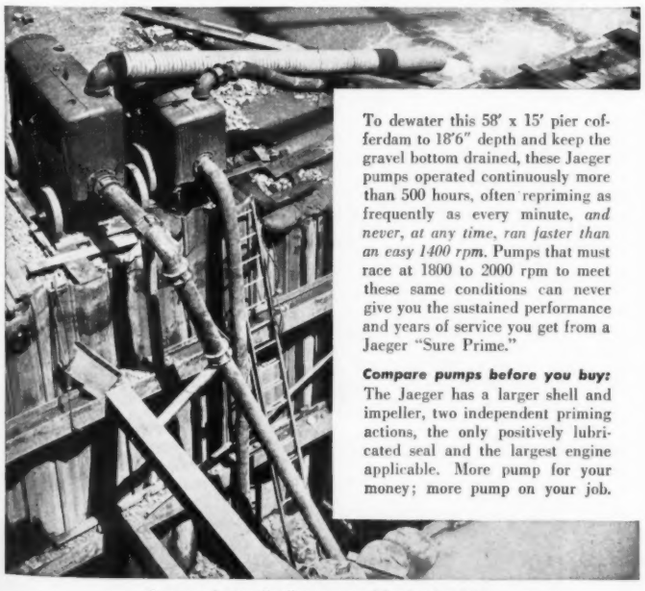
ROCKFORD CLUTCHES

a JAEGER never races to prime



To dewater this 58' x 15' pier cofferdam to 18'6" depth and keep the gravel bottom drained, these Jaeger pumps operated continuously more than 500 hours, often repriming as frequently as every minute, *and never, at any time, ran faster than an easy 1400 rpm.* Pumps that must race at 1800 to 2000 rpm to meet these same conditions can never give you the sustained performance and years of service you get from a Jaeger "Sure Prime."

Compare pumps before you buy: The Jaeger has a larger shell and impeller, two independent priming actions, the only positively lubricated seal and the largest engine applicable. More pump for your money; more pump on your job.

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THE JAEGER MACHINE COMPANY 701 Dublin Avenue Columbus 16, Ohio

COMPRESSORS • MIXERS • TOWERS • PAVING MACHINERY

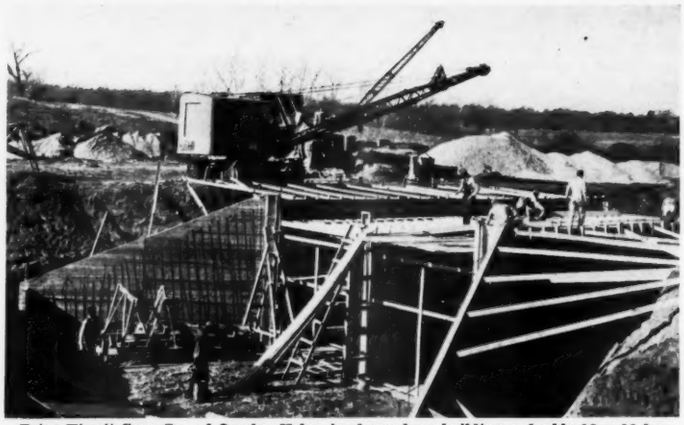
New Turner Turnpike Crosses the OK State

(*Continued from preceding page*)

vegetation will cover the backslopes. The entire median will be covered with 4 inches of topsoil and Bermuda slab sodding.

In cuts, an intercepting dike at the top edge of the slope will prevent water from running down the newly opened ground. Where necessary, an intercepting ditch will run behind this dike and serve to carry the water to a culvert.

The roadside ditches are a minimum of 3 feet below the shoulder grade. They are 5 feet wide and have a rounded bottom. A Bermuda slab sod, 10 inches wide and 6 inches thick, will be placed across the ditch. Spacings will vary with the gradient of the ditch, but will average about 30 inches on centers. Concrete or riprap checks will hold back the water where flows are particularly high.



Peter Kiewit Sons Co., of Omaha, Nebr., is shown here building a double 12 x 12 box culvert to carry one of the many small streams under the Turnpike.

Structures

There will be 66 major structures in all for the turnpike, in addition to many double and triple and some quadruple culverts ranging in size up to four-span 12 x 12 feet. The structures include 12 overpasses, 15 stream crossings, 2 bridges over a highway and a railroad, 4 crossings over railroads, and 33 underpasses. An underpass was used wherever possible since it is cheaper to carry the 4-lane turnpike under an existing road, usually only 2 lanes wide, than over it. Shoulders and the median strip are paved and carried across all bridges less than 100 feet in length. The structures presented no particular problem in design since they are relatively small; the largest is about 400 feet in length.

Financing

Estimated total cost of the Turner Turnpike is $38,000,000. The financing bonds bear an annual average interest rate of 3.43 per cent. They mature in 8 to 40 years; the first is payable in 1958. Revenues accruing from toll charges will retire the bonds. At the end of the 40 years the turnpike will be turned over to the Oklahoma State Highway Department.

Incidentally, the enabling legislative act placed a limit on the size of contracts. The maximums are $500,000 for grading and drainage, $1,000,000 for paving, and $1,000,000 for structures. It also required that contractors employ at least 75 per cent Oklahoma labor.

Personnel

The Turnpike Authority members are: Governor Johnston Murry, member ex-officio; J. Wiley Richardson, Oklahoma City businessman; R. P. Matthews, Sapulpa newspaper publisher; Glenn R. Key Chandler, trucking contractor; and Joe Jarboe, Tulsa businessman and rancher.

H. E. Bailey is General Manager of the Authority and W. D. Hoback is Chief Engineer. A. L. Forrester and F. E. Hathaway are the Construction Engineers for the west and east halves of the turnpike respectively.

T. C. Frederick is Project Manager for DeLeuw, Cather, & Co.; E. G. Rusch is Project Engineer.

Directs P&H Diesel Sales

Don E. Sweeney has been named Sales Manager of the Harnischfeger Corp., Diesel Engine Division, Crystal Lake, Ill. He succeeds R. H. Fitz. Mr. Sweeney was formerly Zone Sales Representative and Manager of the Detroit Diesel Engine Division, General Motors Corp., Detroit, Mich.

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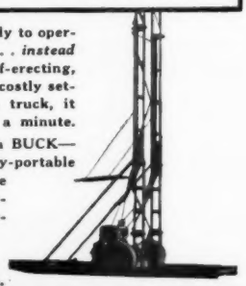
Saves you *plenty!*

CONTRACTORS REPORT THESE AVERAGE COSTS ON "AROUND TOWN" MOVES

OTHER MACHINES	BUCK MACHINE
Moved in—erected—dismantled and removed at cost of $200.00 to $400.00 per job.	Moved in—erected—lowered and removed at cost of only $30 per job!

Your BUCK is set up and ready to operate in less than 25-minutes . . . *instead of hours!* Ready-rigged, self-erecting, self-lowering tower saves you costly set-up. Easily towed by pickup truck, it raises 2000 lbs. at 100 feet a minute.

Save *plenty* on *every* job with BUCK—the *only complete* automatically-portable heavy-duty hoisting machine in the world. Get the money-saving, time-saving, labor-saving facts today!



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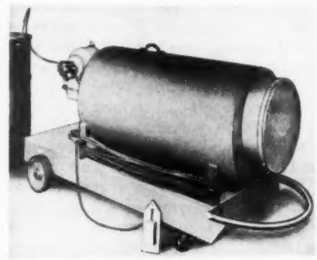

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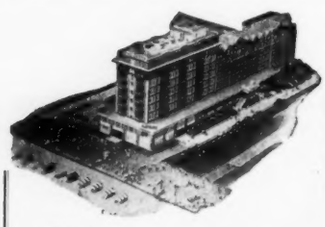

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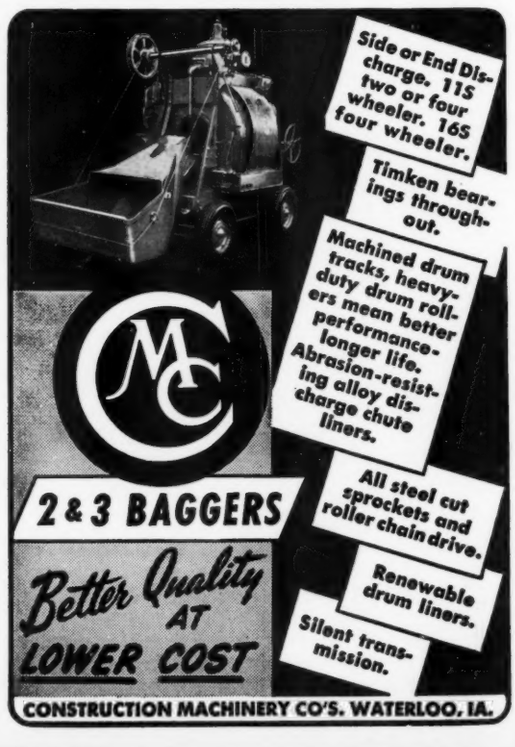
Side or End Discharge. 11S two or four wheeler. 16S four wheeler.
Timken bearings throughout.
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CONSTRUCTION MACHINERY CO'S. WATERLOO, IA.

Time, Labor Saved By Stump Splitter

Thomas Scalzo Co., contracting firm of Seattle, Wash., was faced with a problem. Though the terrain for a new right-of-way on Olympic Peninsula, Wash., had little rock and few boulders, it was studded with huge stumps, ranging up to 8 feet in diameter. Through the ingenuity of the contactor, the Stump Splitter was born, and the problem solved.

The Stump Splitter was a 4 x 6-inch bar of armor-plate steel, 48 inches long. The "business end" was sharpened to a point and the other end was welded to a ½-inch steel plate, shaped to fit the curve of a Bucyrus-Erie bulldozer blade mounted on an International TD-24 crawler tractor. The plate was fastened to the blade by eight ½-inch bolts placed along the cutting edge of the blade with a ½-inch bolt at the top of the plate to steady the rig. A 1-inch gusset was added to each side of the Splitter bar to provide lateral stability.

Contractor Bob Scalzo, left, of Thomas Scalzo Construction Co., Seattle, Wash., explains the design and function of his homemade Stump Splitter. Equipment Salesman Ralph McKernan, of the Howard Cooper Corp., looks intrigued.

In operation, the Stump Splitter is driven into the stump by the tractor, splitting the stump in half. The tractor then uses the pointed bar as a wedge and by pushing the halves of the stump from one side to the other, uproots them. The uprooted stumps are then pushed into piles and burned, the entire operation requiring less than twenty minutes.

According to the owners, the Stump Splitter saved at least 5,000 pounds of blasting powder as well as the time and labor involved in preparing the stumps for blasting.

The company's contract was to clear 4.75 miles of right-of-way for a bypass which will carry State Highway 21A around the town of Poulsbo on the Olympic Peninsula, Wash.

New Appointments By Luria

John H. Porteus has been appointed Chief Engineer of Luria Engineering Co., New York, N. Y., specializer in design and construction of standardized steel structures for industry, commerce, and government. He will make his headquarters at the company's steel-fabricating plant in Bethlehem, Pa.

Samuel D. Kapelsohn, a man with 26 years of experience in the industrial construction field, has been named Manager of the Construction Department. Luria is enlarging this Department's facilities in order to extend its complete construction service in collaboration with architects and general contractors.

Catalog on Rear-Dumps

A new catalog sheet covering the 34-ton-capacity Models 1FFD and 4FFD rear-dumps has been released by The Euclid Road Machinery Co., 1361 Chardon Road, Cleveland 17, Ohio.

Both models feature twin power. They employ side-by-side diesel engines of 380 and 400 total horsepower, each engine driving separate rear axles through torque converters and transmissions. The two models are spring-mounted and hydraulic booster steering is standard equipment. The catalog gives detailed specification data.

This literature may be obtained from the company, or by using the Request Card that is bound in at page 18. Circle No. 713.

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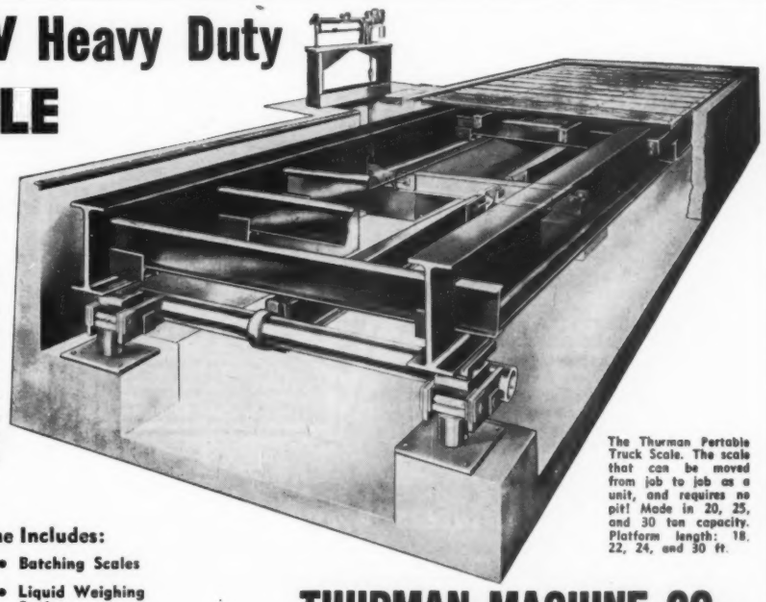
THURMAN Heavy Duty PIT SCALE

Platforms: 18 to 50 Feet

Capacities: 20 to 50 Ton

Built to rigid U. S. Bureau of Standards specifications. Pivots and bearings of fine heat-treated steel, electroplated to resist corrosion. Castings and forgings are oversize for safety. I-beams and cross members are extra heavy structural steel. Pit preparation blue prints are furnished.



The Thurman Portable Truck Scale. The scale that can be moved from job to job as a unit, and requires no pit! Made in 20, 25, and 30 ton capacity. Platform length: 18, 22, 24, and 30 ft.

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- This and other weighing equipment in sizes to fill your requirements.

THURMAN MACHINE CO.
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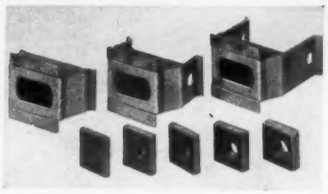
Established 1918
156 North Fifth Street Columbus 15, Ohio

Insert for Concrete

A new adjustable insert for concrete is made by Super-Grip Anchor Bolt Co., Inc., 3333 N. 22nd St., Philadelphia 40, Pa. It is said to eliminate time-consuming "fishing" to get the bolt started in the nut after the nut is placed in the insert. The combination of the elongated hole in the face of the insert and the offset hole in the nut makes it possible to put the nut on the bolt before placing in the insert and then to adjust it to any point of the compass.



The company points out that the Super-Grip inserts have other features: they will support a load of 1,500 to 2,400 pounds; V-shaped notches in the face and two center grooves on the side are said to simplify alignment of the insert on the forms; four small holes in the insert permit placing it on dowel pins or reinforcing rods. Inserts are made of heavy-gage steel and can be obtained for bolt sizes from ¼ to ¾ inch.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 770.

How Hydraulic Tools Solve Many Construction Problems

A 64-page job-picture booklet showing how hydraulic tools can solve production, construction, maintenance, and other problems is available from Blackhawk Mfg. Co., 5535 W. Rogers St., Milwaukee 1, Wis.

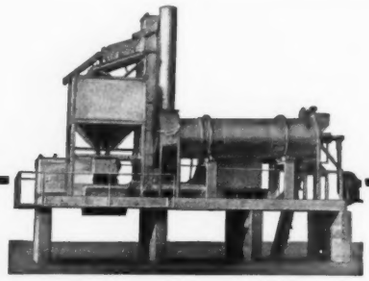
The "Idea Book" contains many large photos and brief descriptions of ideas developed and applied by users of Blackhawk products. These products include remotely controlled hydraulic jack equipment called "Porto-Power" —plus gage-equipped and standard hydraulic jacks. Also involved are Blackhawk pipe benders, knock-out punches, hydraulic pumps, torque indicators, and hand tools. Applications cover production, maintenance, testing, repairing, and general construction.

Typical job photos suggest the general principles of the applications. Accompanying drawings suggest how standard or shop-built attachments work in scores of combinations with Porto-Power hydraulic rams to solve special or routing problems.

This literature may be obtained from the company by requesting Booklet No. 352, or by using the Request Card at page 18. Circle No. 710.

Gar Wood Div. Sales Mgr.

F. Eugene Englander has been appointed Sales Manager of the Richmond Division of Gar Wood Industries, Inc., Richmond, Calif. In his new position, he will direct all sales activities for the products manufactured and sold by the Division, including hoists and dump bodies, Hi-Lift loaders, winches, etc.



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Supplied with oil fired rotary dryer, batch mixer, bitumen heater, vibrating screen, divided hot bin, dust collector, volumetric measure or weigh scales; air controls, engine or electric power.

Sizes: L-12, 12-15 tons per hour. Will pave 25′ street, 2″ thick, one 300′ block per day.
L-25, 25-30 tons per hour. Will cover 20′ road, 1″ thick, at ½-mile per day.

Also portable repair plants, 4 and 8 tons per hour.

Write for catalog and name of nearest dealer

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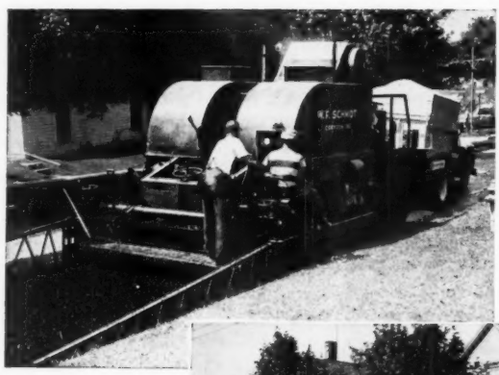
Moto-Paver

Cuts Resurfacing Time-and Costs



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Standard and heavy duty models for all types of resurfacing, retread and stabilization jobs under all kinds of operating conditions. See your local H & B distributor or write for Bulletin MP 49.

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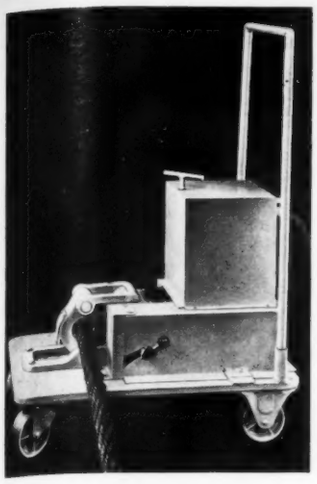

Electric Cable Cutter

An electric motor-driven cable cutter is ready for national distribution by the Pell Cable Cutter Co., 820 Sharon Bldg., 55 New Montgomery St., San Francisco 5, Calif. Retaining all the portable features of the regular Hydrashear line, the electric model will cut up to and including 1¾-inch wire rope in 20 seconds, the company says. It is powered with a ½-hp 110/220-volt single-phase motor-driven hydraulic pump, which develops 10,000 pounds pressure per square inch, and can be plugged into any electric circuit. No special wiring is required.

The unit is furnished skid-mounted and is arranged for mounting on either casters or wheels to suit user's convenience. The Model EC Hydrashear is approximately 24 inches long, 15 inches wide, and weighs about 135 pounds. It can be bench-mounted or operated wherever the wire rope is to be cut.

The Hydrashear works like this: put rope in place, close electric switch, and the unit will cut through the rope. Upon completion of cut the motor automatically turns off. Open release valve and the blade retracts and is ready for another cut. When necessary, the blade can be replaced or resharpened in a matter of seconds.

Further information may be secured from the company. Or use the Request Card that is bound in at page 18. Circle No. 762.

Fluid Torque Drive

Fluid torque drive as a standard installation on its ½-yard crawler and mobile machines is announced by Unit Crane & Shovel Corp., 6411 W. Burnham St., Milwaukee 14, Wis. It is said to provide smoother load handling by throttle, and cushions lifting and digging with greater work output and without increasing fuel consumption.

The torque converter in mobile equipment allows for smooth breakaway performance. The installation still retains the Unit method of mounting the engine in line with the main machinery. Connection to a worm-driven power takeoff by means of a chain coupling eliminates the engine clutch and its lever system.

The company reports that the installation, accomplished by the use of a 6-cylinder industrial gasoline engine and Chrysler torque converter, has been field-tested in all operations as a shovel, trenchoe, clamshell, dragline, etc. These tests, it adds, showed advantages in each instance in comparison with the conventional drive.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 768.

House Magazine Covers Heavy-Duty Transmissions

Publication of the first issue of "Transmission Topics," a new magazine-type house organ designed to cover on-and-off highway and industrial users of heavy-duty transmissions, is announced by Fuller Mfg. Co., Kalamazoo, Mich.

With on-the-job illustrations, the issue covers a variety of Fuller users in heavy-hauling, contracting, logging, mining, and other fields. A feature article describes how the new International Harvester proving ground near Phoenix, Ariz., gives rugged tests to Fuller-equipped trucks on a round-the-clock schedule.

Other features include Fuller's current expansion program—with photos of three new plant facilities. High points of the new Road Ranger, the 10-speed one-lever no-gear-splitting transmission, and reports on the new 1220 transmissions, including torque-converter-type models, are also included.

This literature may be obtained from the company, or by using the Request Card at page 18. Circle No. 785.

Power-Driven Scythe

An improved power-driven portable scythe for cutting and trimming weeds, reeds, and grass on any terrain and underwater is announced by Hoffco, Inc., 411 N. 8th St., Richmond, Ind. The Scythette features a 2-hp 4,000-rpm engine of the single-cylinder 2-cycle 2-port type. A float-feed carburetor with built-in push-button dump valve, a manually operated throttle control with spring return, and a one-quart capacity gas tank are also among the changes.

Other standard specifications include 26-pound weight, 54-inch length, convenient over-the-shoulder carrying strap, and 20-inch cutter bar. The new unit has also changed colors and is now painted a brilliant highway yellow with red trim.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 704.

White Motor Sales Manager

Lee E. Copple has been named Sales Manager of the Construction and Mining Equipment Department of the Sterling Division of White Motor Co., Milwaukee, Wis. The new department was created to handle the special sales and application needs of these industries as regards Sterling off-highway models.

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Note the priming action illustrated above. The air and water are discharged through channel "A" into the chamber, where the air escapes from the water. The heavier air-free water is pulled downward again through channel "B" to the impeller where more air is entrained, discharged upward and released until the priming cycle is completed.

Gorman-Rupp pumps will pump more dirty water, more hours, with less fuel than any other self-priming pump. Being practically trouble-free they require a minimum of maintenance.

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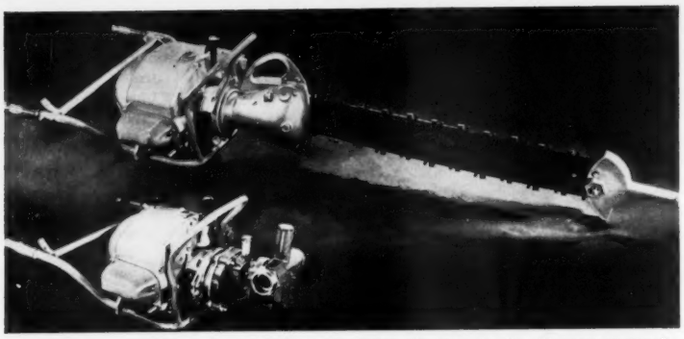

The 18-pound portable pump in the foreground attaches to the Mercury-powered Disston chain saw in less than 60 seconds. Result—a high-pressure water pump.

Chain Saw or Pump

An 18-pound portable pump that attaches to a Mercury-powered Disston Model DA-211 chain-saw engine without any modification has been developed by the Kiekhaefer Corp., Fond du Lac, Wis. The change from pump to chain saw or vice versa can be made in less than a minute, without tools.

The total weight of engine and pump is 63 pounds. The unit pumps 50 gpm at 125 psi.

Further information may be secured from the company. Or use the Request Card at page 18. Circle No. 849.

Portable Asphalt Plant Produces 40 Tons Per Hour

A new catalog on the Little Monster portable asphalt paving plant is issued by Madsen Iron Works, Inc., P. O. Box 589, Huntington Park, Calif. It illustrates and describes all the essential features of the unit and gives complete specifications.

The portable plant has an over-all length of 38 feet and an over-all width of 8 feet. With a one-minute batch it will produce 30 tons per hour and with 45-second batches, 40 tons per hour.

The cold aggregate, which has previously been screened into two graded sizes, is fed into the dual-compartment feed bunker by a front-end loader. A reciprocating plate feeder on each compartment prorates and feeds each graded aggregate to the respective counter-flow rotary dryers by means of bucket elevators.

Here the aggregates are heated and dried as they travel toward the hot end. The two graded materials are discharged into the boots of the enclosed hot-stone elevators, carried upward, and deposited into the two-compartment storage bin.

The aggregate is next weighed in the weigh box. Asphalt is weighed into the asphalt bucket. The weigh box and the asphalt bucket are suspended separately, and the weights, as they are loaded, are indicated on respective beams and dials. The aggregate is then dropped into the twin-shaft pugmill where, combined with the injection of hot asphalt, it is thoroughly mixed. A discharge door at the bottom of the mixer is opened to allow the mixture to fall into a skip car for loading to trucks.

This literature may be obtained from the company, or by using the Request Card at page 18. Circle No. 769.

"Now then—which one of you was driving the truck crane?"

Corps of Engineers Appoints

Colonel Hubert S. Miller has been assigned District Engineer for the Army Corps of Engineers at Omaha, Nebr. He replaces Colonel Henry J. Hoeffer, who became Commanding Officer of the 354th Engineer Combat Group, Fort Lewis, Wash. Col. Miller was recently engineer with the United States Forces in Austria.

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